KAYE

DIGI 4 PLUS MAINTENANCE MANUAL

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DIGI 4 PLUS MAINTENANCE MANUAL

(For use with Software Level V2.21 and above.
Digistrip 4 Plus and Digi-Link 4 Plus)

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INTRODUCTION

The Digi 4 Plus Maintenance Manual contains instructions for on-site maintenance of your Digi 4 Plus. Because most components are not user-serviceable, these procedures include only diagnostic tests, adjustments and board exchanges. Except for certain calibrations that must be done by a skilled technician, no special training is necessary to perform the maintenance.

Each procedure contains step-by-step directions, a list of the equipment you need and precautions you should observe. Figures at the beginning of each section provide a convenient reference for board and component locations.

Do not begin a procedure until you read the general information for that section. If a procedure references another section, read the general information for that section as well.

The manual has seven sections and three appendixes:

- Section 1 describes calibration procedures.
- Section 2 describes board exchange procedures.
- Section 3 describes printer maintenance procedures.
- Section 4 describes troubleshooting procedures.
- Section 5 contains packing and shipping instructions.
- Section 6 contains instructions for contacting Kaye with special problems.
- Appendix A contains Digi 4 Plus specifications
- Appendix B contains printed circuit board schematics, system wiring diagrams and outline drawings.
- Appendix C contains diagnostic codes.
- Appendix D contains the product warranty.

SECTION 1 - CALIBRATION

1.1 General Information

Kaye fully calibrates each Digi 4 Plus before shipment. They should require no further adjustment or calibration during installation. However, periodic adjustments may be required to insure continued accuracy.

Under normal operating conditions, check and calibrate the Digi 4 Plus once a year. If you use a Digi 4 Plus for high accuracy measurements, you may have to certify the calibration more often. You may also have to calibrate it after servicing; for example, if you replace or add circuit boards.

The order that you complete the adjustments is very important so be sure to follow the calibration procedures step-by-step. Calibrate the 4 Plus Analog board first, then the Reference RTD on each 4 Plus Analog Scanner. Sections 1.2 and 1.3 describe these procedures.

Use a ground strap during calibration to prevent static discharge damage to the printed circuit boards. Also, for safety considerations, disconnect any high voltage inputs.

Section 1.4 explains how to enable/disable the open ciruit test.

The line frequency of the power source should match that of the Digi 4 Plus (50 or 60 Hz). Slide 4 of DIP switch S1 on the 4 Plus Data Acquisition board defines 50 or 60 Hz. Set slide 4 off (factory default setting) for 60 Hz and on for 50 Hz.

1.2 4 Plus Analog Board Calibration

The 4 Plus Analog board (P/N U0923) is a digital voltmeter (DVM) that measures analog input to the Digi 4 Plus. It is mounted under the cabinet top on the Digistrip 4 Plus and behind the Display panel on the Digi-Link 4 Plus. Kaye calibrates 4 Plus Analog boards before shipment, so you should not have to calibrate the board during installation. However, you should calibrate it annually to maintain peak system accuracy.

Equipment Required:

- High quality, laboratory grade precision voltage source with ±0.001% accuracy on all ranges. If a voltage source with less accuracy is used, the accuracy of the calibration specifications is reduced.
- Small calibration screwdriver

Notes:

The adjustment order is important because the ±6.0000 V adjustments directly affect the + and - spans of all other voltage ranges.

When you calibrate the 60 mV and 30 mV ranges, connect copper leads to the Digi 4 Plus terminals to avoid thermoelectric voltages from interfering with the accuracy of the reading.

There are no adjustments for the zero width or 12 volt range.

Procedure:

1. For optimum stability during the initial adjustments, we use a filter time constant of 2 seconds to produce a more steady reading. After the adjustment is complete, eliminate the filter time constant and the reading should remain within specifications. See Table 1-1.

   For this exercise, we arbitrarily selected CALC channel address 099 to store the filter time constant. Assign function code 114 to CALC channel address 099 and set Input 1 equal to 00002.

2. Connect your precision voltage source to the input terminals of channel address 101.

   Program Channel 101 for the 6.0000 V range (function code 003). Assign the address of the filter time constant (099) to Source 2.

   Set voltage source for 6.0000 V and view the data at channel address 101. Adjust +6.0 V pot (P1) for 6.0000 V (±0.0001 V). Wait 20 seconds to let the filter settle.

   Set voltage source for -6.0000 V. Adjust -6.0 V pot (P2) for -6.0000 V (±0.0001 V). Wait 20 seconds to let the filter settle.

3. Calibrate the 600.00 mV range. Program Channel 101 for the 600.00 mV range (function code 002). Assign the address of the filter time constant (099) to Source 2.

Set voltage source for -600.00 mV and view the data at channel address 101. Adjust 600.00 mV pot (P3) for -600.00 mV (±0.01 mV). Wait 20 seconds to let the filter settle.

Note:

Many voltage sources do not have a 600.00 mV or a 1 V range. If you use a 10 V range directly, it compromises the accuracy of the 600.00 mV calibration. We recommend that you use a ten to one precision divider on the 10 V range so that an output of 6.0000 V yields 600.00 mV.

4. Calibrate the 60.000 mV range. Program Channel 101 for the 60.000 mV range (function code 001). Assign the channel address of the filter time constant (099) to Source 2.

   Set voltage source for 00.000 mV (not shorted), wait 20 seconds to let the filter settle and write down the reading. Set voltage source for -60.000 mV, wait 20 seconds to let the filter settle and write down the reading at channel address 101.

   The difference between the two readings should be 60.000 mV (±0.001 mV). If it is not,adjust the 60.000 mV pot (P4).

5. Calibrate the 30.000 mV range. Program Channel 101 for the 30.000 mV range (function code 005). Assign the channel address of the filter time constant (099) to Source 2.

   Set voltage source for 00.000 mV (not shorted), wait 20 seconds to let the filter settle and write down the reading at channel address 101. Set voltage source for -30.000 mV, wait 20 seconds to let the filter settle and write down the reading at channel address 101.

   The difference between the two readings should be 6.0000 (±0.0002). If it is not, adjust the 30.000 mV pot (P5).

Table 1-1 shows the accuracy of unfiltered voltage inputs for short term, 30 days and 1 year. The short term specifications are within one hour of calibration and ±1°C of the calibration temperature. The specifications for 30 days and 1 year include a ±5°C change from the calibration temperature. To verify the calibration, check the unfiltered readings on all ranges.

Table 1-1. Unfiltered readings after calibration

Range	Short term	30 day	1 year
6.0000 V	±0.0002 V	±0.0004 V	±0.0006 V
600.00 mV	±0.02 mV	±0.04 mV	±0.06 mV
60.000 mV	±0.006 mV	±0.008 mV	±0.010 mV
30.000 mV	±0.0008	±0.0010	±0.0012

* ½ microvolt counts

1.3 Reference RTD Calibration

You can connect up to eight (8) Scanners, mounted on an expansion module, to a Digi 4 Plus. Each Scanner is connected to a UTR board that houses a 100 ohm platinum RTD. When a Digi 4 Plus processes thermocouple inputs, each RTD senses the temperature of the terminal block connectors and provides automatic ice point reference compensation. Channels 901 through 908 display the mV drop across each scanner's RTD. Readings should be between 28 and 33 mV, depending on ambient temperature.

Kaye calibrates all thermocouple reference RTD's before shipment. You should calibrate Digi 4 Plus reference RTD's annually. You may have to certify the calibration more often when making high accuracy measurements.

Calibrate thermocouple reference RTD's at ice point, using a Kaye Model K140-4 Ice Point Reference or a crushed ice bath*.

Equipment Required:

- Kaye Model K140-4 Ice Point Reference, or a crushed ice bath
- Small regular screwdriver
- Premium grade thermocouple

Procedure:

1. Prepare the ice point reference or crushed ice bath*. Place it in a convenient location for conducting the calibration.

2. Turn the Digi 4 Plus off and connect one type E, J, K, N or T thermocouple (premium grade Type T, if available) to the input terminals of a channel on each Scanner you are calibrating. We do not recommend type B, C, R and S thermocouples for this procedure because of their low output level in the ice point range.

3. Turn on the ice point and the Digi 4 Plus, program each channel with the corresponding thermocouple function and let the temperature stabilize for approximately 2 hours.

   Use Table 1-2 on the following page to determine the thermocouple function code that you use for each test channel.

---

* Use the following procedure to prepare an ice bath:
  - Fill a Dewar (vacuum) flask with crushed or shaved ice made with pure water, preferably distilled. Add pure water and allow it to cool to the ice point.
  - Decant some liquid from the flask and replace it with ice. Repeat the procedure until ice extends to the bottom of the flask.
  - Periodically drain the melted water and replace it with ice. Failure to do this can cause an error of as much as 4°C, even though there is still ice in the flask.

Table 1-2. Thermocouple Function Codes

Thermocouple Type	Function Code Deg F	Deg C
E	022	023
J	024	025
K	027	028
N	029	030
T	035	036
T (0.01C)	---	037

4. Place the test thermocouple(s) in the ice point reference or crushed ice bath. Allow them to temperature stabilize for approximately 15 minutes.

5. Access a thermocouple test channel and note the reading.

6. Adjust the set screw on the UTR board until the test channel display reads 32.0°F or 0.0°C (0.00°C if you use Function Code 037). After adjustment the reading should be stable within ±0.1° C or F (0.05°C if you use Function Code 037).

   The set screw can be accessed from the outside; you do not have to remove the Analog Plus scanner. Access the set screw from the far right of the scanner below the first row of screw terminals.

7. Repeat steps 6 and 7 to calibrate other 4 Plus Analog Scanners.

1.4 Enable/Disable Open Circuit Test

The Digi 4 Plus has an open circuit test for the ±32mV, ±60mV and ±600mV input ranges. When enabled, the Digi 4 Plus sends a pulse to each analog input. If an open circuit is detected, the open circuit light turns on. There is no open circui test for the ±6V and ±12V ranges.

The open circuit test is enabled when the junper on the front of the Analog 4 board covers the pins lableled OC. The Digi 4 Plus is shipped with the open circuit test enabled.

The open circuit test is disabled when the jumper covers the pins labeled OC NOT. If disabled, no pulse is sent to the input terminals.

SECTION 2 - BOARD EXCHANGE

2.1 General Information

Although the Digi 4 Plus provides long term, reliable operation, it may require occasional repairs. Because most components are not user-serviceable, you normally make these repairs by exchanging boards.

Section 2.2 describes Digistrip 4 Plus board exchange procedures.

Section 2.3 describes Digi-Link 4 Plus board exchange procedures.

Each section includes diagrams to reference board locations.

Individual procedures list equipment you need and special precautions you must observe. In addition, observe the following precautions for all exchanges:

- Eliminate all external power source to the system. This includes any power to the relay contacts and status input terminals.
- Touch the Digi 4 Plus chassis to drain any static charge from your body.
- Use an anti-static ground strap.
- Handle boards only by the edges.
- Transport and store boards in anti-static bags.

Although most connectors are keyed, note the orientation of all cables and the order in which you disconnect them. Remove cables at their connectors; do not unsolder them. Replace any wires you remove.

2.2 Digistrip 4 Plus Board Exchange

This section describes exchange procedures for the following boards:

2.2.1 4 Plus DA
2.2.2 Print Control w/Trending
2.2.3 4 Plus Analog
2.2.4 Interface
2.2.5 Master Relay
2.2.6 Serial I/O
2.2.7 Power Supply
2.2.8 4 Plus Scanner (Analog Panel)
2.2.9 UTR
2.2.10 Status Sense
2.2.11 RTD
2.2.12 4 Plus RTD Power
2.2.13 4 Plus Scanner (RTD Panel)
2.2.14 Operator Panel

Individual procedures list the equipment you need and special precautions you should observe. In addition, observe the precautions on page 2-1.

See Figures 2-1 and 2-2 on the following pages to reference board locations. See Appendix B for schematics and wiring diagrams.

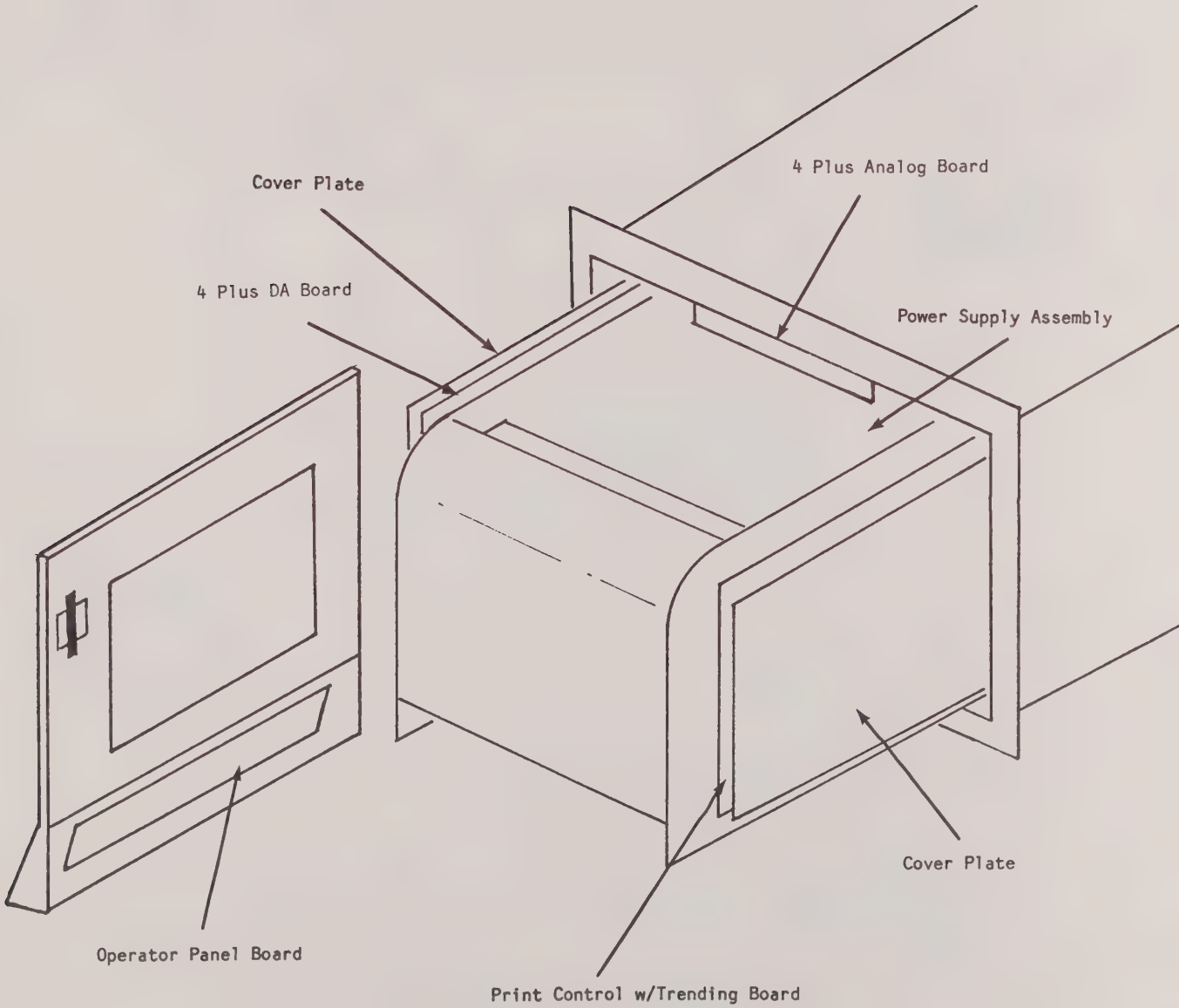


Figure 2-1. Digistrip 4 Plus (Front Interior View)

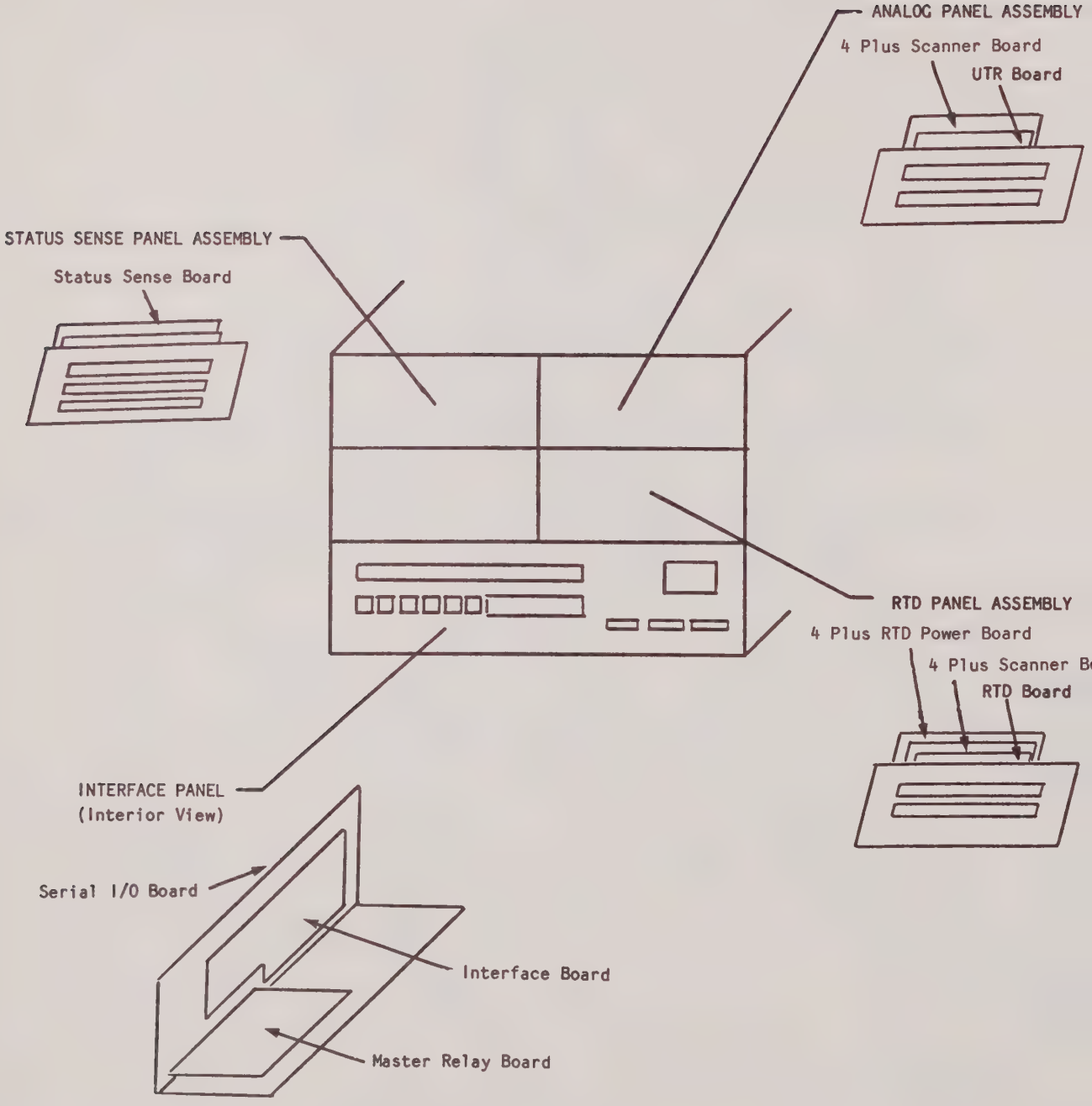


Figure 2-2. Digistrip 4 Plus (Rear View)

2.2.1 4 Plus Data Acquisition (4 Plus DA) Board

The 4 Plus Data Acquisition (4 Plus DA) board (P/N U0918) controls the operation of the Digistrip 4 Plus. It contains a microprocessor, memory storage capacity, and some of the I/O signal circuitry. The 4 Plus DA board is on the left side of the internal chassis.

CAUTION:

This board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- Phillips screwdriver
- 1/4" nut driver
- Anti-static ground strap

Procedure:

1. Open the front door and turn the power switch off.

2. Slide the chassis forward. Remove the five screws that secure the cover plate (left side of chassis). Remove the cover plate.

3. Disconnect the ribbon cable from J4 (top right of board).

4. Disconnect the ribbon cables from J1 and J2 and the multi-conductor cable from J3 (all at rear of board).

5. Remove the five hex standoffs. Remove the board.

6. Set the DIP switch S1 and S2 slides (left rear of replacement board) to match the original board.

7. Reassemble the unit with the replacement board. You must connect J3 before you connect J2.

8. Reinitialize* the system. Reprogram** the Digi 4 Plus.

---

* To reinitialize the system:
  - Make sure the power cord is connected and the power switch is off.
  - Place the jumper (upper left corner of board) in the INITLZ position (two front pins).
  - Turn the power switch on.
  - Place the jumper in the NORMAL position (two rear pins).

See Section 2.1.6 of the User's Manual for more information.

** To offload and load programs with a Cassette Program Loader (CPL), see Appendix A of the User's Manual.

2.2.2 Print Control w/Trending Board

The Print Control w/Trending board (P/N U0909) controls outputs to the internal printer. It is on the right side of the internal chassis.

Kaye factory adjusts all Print Control w/Trending boards before shipment and they normally require no further adjustment during installation. However, if you install a new board, check printer operation to insure satisfactory print quality. If it needs adjustment, make it at this time.

CAUTION:

This board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- 1/4" nut driver
- Small regular screwdriver
- Phillips screwdriver
- Anti-static ground strap
- Oscilloscope

Procedure:

1. Open the front door and turn the power switch off.
2. Slide the chassis forward. Remove the four screws from the cover plate (right side of chassis). Remove the cover plate.
3. Disconnect the stepper motor cable from J5 (top left corner of board).
4. Disconnect the printhead cable from J4 (lower left corner of board).
5. Disconnect the ribbon cables from J1 and J3 (right side of board).
6. Remove the four hex standoffs. Remove the board.
7. Set the DIP switch slides (right center of replacement board) as follows:

DIP Switch Settings

8. Reassemble the unit with the replacement board. Do not install the cover plate.

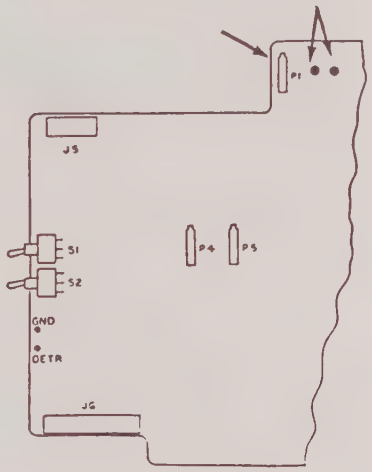
9. Use either Method A (LED's) or Method B (oscilloscope) below to calibrate the replacement board. The oscilloscope method produces a more exact calibration.

Print Control w/Trending Board Calibration

Method A:
Set S1 up. Power on. As the printhead moves from one side to the other, monitor the two LED's (next to P1). See the diagram at right.

If both LED's have the same intensity, no further adjustment is necessary.

If the left LED is brighter, turn P1 (upper left corner of board) counter clockwise two revolutions. Toggle S1 while monitoring the LED's. Repeat this step until both LED's have the same intensity.



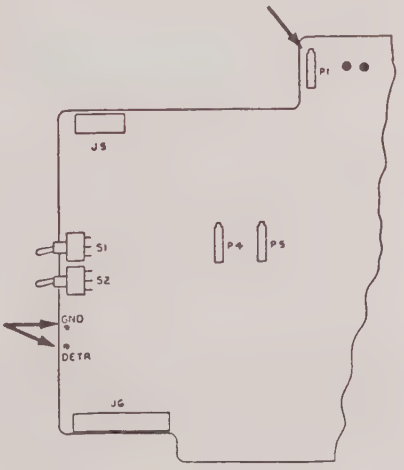
Test Points

If the right LED is brighter, turn P1 clockwise two revolutions. Toggle S1 while monitoring the LED's. Repeat this step until both LED's have the same intensity.

If the LED calibration is too far off, the printhead will not move when you toggle S1 and you can not monitor the LED's. Adjust P1 and then power off and on.

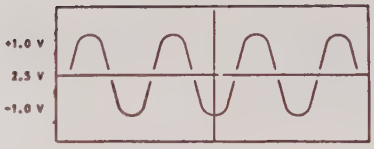
Method B:
Set S1 up. Power on. Connect the oscilloscope's ground strap to the GND test point. Touch the oscilloscope's probe to the DETR test point (both front center of board). See the diagram at right.

Set the oscilloscope to register an amplitude of 0.5V/ division and a time base of 2ms/division.



Test Points

Monitor the oscilloscope screen for a timing pulse sine wave with a hysteresis point on the center horizontal line. When you have adjusted the timing pulse properly, the portions of the wave above and below the hysteresis point should be the same, approximately 1.0 V. See the diagram at right.



Properly Adjusted Timing Pulse

Adjust the set screw on P1 (upper left corner of board) to provide the proper timing pulse. Turn it clockwise to decrease the amplitude of the sine wave; turn it counterclockwise to increase the amplitude.

10. Replace the cover plate.

2.2.3 4 Plus Analog Board

The 4 Plus Analog board (P/N U0923) is a digital voltmeter that measures analog input. It is in a sliding panel under the top front of the case.

> CAUTION:
> This board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- Phillips screwdriver
- 1/4" nut driver
- Allen wrench set
- Regular screwdriver
- Anti-static ground strap

Procedure:

1. Open the front door and turn the power switch off.
2. Remove the two mounting screws that secure the tray. Slide out the Analog shield panel assembly.
3. Disconnect the ribbon cables from J2 and J26 (lower right rear of board).
4. Disconnect the four-wire cable from J21 (center rear of board).
5. Remove the four screws that secure the 4 Plus Analog board to the paper shield. Remove the board.
6. Set the Dip switches on the replacement 4 Plus DA board to match those of the original board.
7. Reassemble the unit with the replacement board.

2.2.4 Interface Board

The Interface board (P/N U0988) controls communications with external devices. It is behind the left side of the Interface panel. The Interface panel is on the lower rear of the unit.

WARNING:

The relay output connector on the Interface panel may emit dangerous, user-supplied voltages when the power is off.

CAUTION:

This board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- Phillips screwdriver
- Anti-static ground strap

Procedure:

1. Open the front door and turn the power switch off.

2. Remove the five mounting screws that secure the Interface panel (lower rear of unit). Remove the panel. The Interface board is behind the panel on the left.

3. Disconnect the four-wire cable from J10 (right side of board).

4. Disconnect the ribbon cables from J1 and J11 (bottom of board), J7 (left side of board) and J13 (top of board).

   If you have a Status Input board, disconnect the ribbon cable from J12 (top of board).

5. Remove the five mounting screws. Lift out the board.

6. Reassemble the unit with the replacement board.

2.2.5 Master Relay Board

The Master Relay board (P/N U0993) contains the odd, even and watch dog relays, the RS-232 communications connector, and the RC-8R connector. It is behind the right side of the Interface panel. The Interface panel is on the lower rear of the unit.

WARNING:
The relay output connector on the Interface panel may emit dangerous, user-supplied voltages when the power is off.

CAUTION:
This board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- Phillips screwdriver
- Allen wrench set
- Anti-static ground strap

Procedure:

1. Open the front door and turn the power switch off.

2. Eliminate any power to the relay contacts.

3. Remove the orange relay output connector (lower right of Interface panel).

4. Remove the five mounting screws that secure the Interface panel.

5. Remove the two hex standoffs that secure the RS-232 connector to the Interface panel (left of RC-8R connector). Remove the Interface panel.

6. Remove the two screws on top of the Master Relay board.

7. Disconnect the ribbon cables from J1 and J11 (bottom of Interface board), J7 (left side of board) and J13 (top of board).

   If you have a Status Input board, eliminate any power to the status inputs. Disconnect the ribbon cable from J12 (bottom of Interface board).

8. Remove the Master Relay board.

9. Reassemble the unit with the replacement board. Restore power to the relay contacts and status inputs.

2.2.6 Serial I/O Board

The Serial I/O board (P/N U0936) contains the serial input/output screw terminal connectors. It is behind the input/output terminals on the left side of the Interface panel. The interface panel is on the lower rear of the unit.

WARNING:

The relay output connector on the Interface panel may emit dangerous, user-supplied voltages when the power is off.

CAUTION:

This circuit board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- Phillips screwdriver
- Anti-static ground strap

Procedure:

1. Open the front door and turn the power switch off.
2. Remove any connections from the input/output terminals (rear of unit).
3. Remove the three mounting screws that secure the input/output terminals.
4. Tip the top edge of the Serial I/O board forward and lift it out of the Interface panel.
5. Disconnect the ribbon cable from J13 (top of Interface board).
6. Set the DIP switch slides (center of replacement board) to match the original board.
7. Reassemble the unit with the replacement board. Reattach any connections to the input/output terminals.

2.2.7 Power Supply Chassis Assembly

The power supply chassis assembly (P/N V2125--115 V, V2125E--230 V) is a switching power supply that operates over a wide range of input voltages to provide a constant output voltage. It contains the power supply and the Power Distribution board. The power supply chassis assembly is on the bottom rear of the chassis, under the upper paper tray.

Kaye factory adjusts all replacement power supplies before shipment and they normally need no further adjustment during installation.

CAUTION:
This circuit board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- 11/32" open-end wrench
- Allen wrench set
- Regular screwdriver
- Anti-static ground strap

Procedure:

1. Open the front door and turn the power switch off.
2. Slide the chassis forward. Remove the printer paper.
3. Remove the two screws that secure the front edge of the upper paper tray. Lift out the tray, rear edge first.
4. Remove the screw on the small support bracket on top of the power supply chassis assembly (attached to the cross bar).
5. Remove the three nuts (bottom rear) that secure the power supply chassis assembly to the base plate.
6. Disconnect the AC cables from J20, J21, and J22, the two-wire cable from J23, the ribbon cable from J9 and the optical light cable from J10 (all on right side of chassis).
7. Disconnect the ribbon cable from J3 (left side of chassis).
8. Tilt the power supply chassis assembly toward you. Grasp it at the top with your thumb and index finger, pull it forward and lift it up and out. Do not touch any components.
9. Look through the perforated cover (upper left corner of replacement assembly) to make sure input line voltage switches S1 and S2 are set for 115 volts (domestic use) or 230 volts (foreign use).
10. Reassemble the unit with the replacement assembly. Do not disturb wires around the power supply.

2.2.8 4 Plus Scanner Board -- 4 Plus Analog Panel Assembly

The 4 Plus Scanner board (P/N U0933) provides relay switching of analog inputs such as thermocouples and voltages. It is part of the 4 Plus Analog panel assembly (P/N V2222), which contains:

- The Terminal mounting panel (P/N J7370)
- The Scanner board (P/N U0933)
- The UTR board (P/N U0934)

The 4 Plus Analog panel assembly is on the rear of unit. Look for the mounting panel with a black label and the words ANALOG PLUS. The 4 Plus Scanner board is at the back of the 4 Plus Analog panel assembly.

Because the 4 Plus Scanner board is separate from the Terminal mounting panel, you do not have to disconnect analog inputs when you exchange the board.

WARNING:

The relay output connector on the Interface panel may emit dangerous, user-supplied voltages when the power is off.

CAUTION:

This circuit board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Always handle the circuit board by the edges only. Transport and store it in a protective anti-static bag.

Equipment Required:

- Phillips screwdriver
- Regular screwdriver
- Anti-static ground strap

Procedure:

1. Open the front door and turn the power switch off.
2. Eliminate any voltage to the analog inputs.
3. Remove the four screws that secure the Terminal mounting panel. Remove the 4 Plus Analog panel assembly.
4. Disconnect the ribbon cable from J26 (lower left corner of 4 Plus Scanner board--on your right).
5. Remove the three screws that secure the 4 Plus Scanner board to the Terminal mounting panel. Unplug board from terminal mounting panel.
6. Select the same bank on the two pin jumper (lower left corner of replacement board) as the original board.
7. Reassemble the unit with the replacement board. Restore voltage to the analog inputs.

2.2.9 UTR Board

The UTR board (P/N U0934) provides ambient temperature reference for each 4 Plus Analog panel assembly. It is part of the 4 Plus Analog panel assembly (P/N V2222), which contains:

- The Terminal mounting panel (P/N J7370)
- The Scanner board (P/N U0933)
- The UTR board (P/N U0934)

The 4 Plus Analog panel assembly is on the rear of the unit. Look for the mounting panel with a black label and the words ANALOG PLUS. The UTR board is directly behind the Terminal mounting panel.

WARNING:

The relay output connector on the Interface panel may emit dangerous, user-supplied voltages when the power is off.

CAUTION:

This board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- Phillips screwdriver
- Regular screwdriver
- Anti-static ground strap

Procedure:

1. Open the front door and turn the power switch off.

2. Eliminate any voltage to the analog inputs.

3. Remove the four screws that secure the Terminal mounting panel. Remove the 4 Plus Analog panel assembly.

4. Disconnect the ribbon cable from J26 (lower left corner of 4 Plus Scanner board--on your right).

5. Remove the three screws that secure the 4 Plus Scanner board to the Terminal mounting panel. Unplug the 4 Plus Scanner board from the UTR board.

6. Reassemble the unit with the replacement board. Restore voltage to the analog inputs.

2.2.10 Status Sense Board

The Status Sense board (P/N U0982) measures digital inputs from external devices. It is part of the Status Sense panel assembly (P/N V2226), which contains:

- The Terminal mounting panel (P/N J7980)
- The Status Termination board (P/N U0981)
- The Status Sense board (P/N U0982)

The Status Sense panel assembly is in the two left slots at the rear of the unit. Look for the mounting panel with a red label and the words STATUS INPUT. The Status Sense board is at the back of the Status Sense panel assembly.

WARNING:

The relay output connector on the Interface panel may emit dangerous, user-supplied voltages when the power is off.

CAUTION:

This board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- Phillips screwdriver
- Regular screwdriver
- Anti-static ground strap

Procedure:

1. Open the front door and turn the power switch off.

2. Eliminate any voltage to the status inputs.

3. Remove the four screws that secure the Terminal mounting panel. Remove the Status Panel assembly.

4. Disconnect the ribbon cable from J12 (lower left corner of Status Sense board--on your right).

5. Remove the two screws that secure the Status Sense board to the Terminal mounting panel.

6. Carefully pry J29 and J30 on the Status Sense board to separate it from the Status Termination board. Remove the Status Sense board.

7. Select the same bank on the two pin jumper (lower left corner of replacement board) as the original board.

8. Reassemble the unit with the replacement board. Restore voltage to the status inputs.

2.2.11 RTD Board

The RTD board (P/N U0996) contains the bridge completion resistors and provides input terminals for the termination of an external RTD. It is part of the 4 Plus RTD panel assembly (P/N *), which contains:

- The Terminal mounting panel (P/N J7370)
- The 4 Plus Scanner board (P/N U0933)
- The 4 Plus RTD power board (P/N U0985)
- The RTD board (P/N U0996)

The 4 Plus RTD panel assembly is on the rear of the unit. Look for the mounting panel with a blue label and the words RTD PLUS. The RTD board is directly behind the Terminal mounting panel.

Equipment Required:

- Phillips screwdriver
- Regular screwdriver
- Anti-static ground strap

Procedure:

1. Open the front door and turn the power switch off.

2. Remove any external input connections (rear of unit).

3. Remove the four screws that secure the terminal blocks to the Terminal mounting panel. Do not remove the module from the unit.

4. Pull the terminal blocks forward. Disconnect the ribbon cable from J28 (center of RTD board).

5. Remove the four screws that secure the RTD board to the Terminal mounting panel. Remove the board.

6. Reassemble the unit with the replacement board. Reattach any external input connections.

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*V2236A 100 OHM PT RTD, .01C
V2236B 100 OHM PT RTD, .1C/F
V2236C 10 OHM CU RTD, .1C/F

2.2.12 4 Plus RTD Power Board

The 4 Plus RTD power board (P/N U0985) provides excitation to the RTD board. It is part of the RTD panel assembly (P/N *), which contains:

- The Terminal mounting panel (P/N J7370)
- The Scanner board (P/N U0933)
- The 4 Plus RTD power board (P/N U0985)
- The RTD board (P/N U0996)

The RTD panel assembly is on the rear of the unit. Look for the mounting panel with a blue label and the words RTD PLUS. The 4 Plus RTD power board is at the back of the RTD panel assembly.

CAUTION:

This board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- Phillips screwdriver
- Regular screwdriver
- Anti-static ground strap

Procedure:

1. Open the front door and turn the power switch off.

2. Remove the four screws that secure the Terminal mounting panel. Remove the RTD panel assembly.

3. Remove the two screws on the 4 Plus RTD power board.

4. Disconnect the ribbon cable that extends from the top of the board to J27 (center of 4 Plus Scanner board).

5. Disconnect the ribbon cable that extends from the bottom of the board to J28 (center of RTD board). Remove the board.

6. Reassemble the unit with the replacement board. It is easier if you connect J27 first. Place the cable on the connector and then carefully proess it to the RTD board with a screwdriver.

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*V2236A 100 OHM PT RTD, .01C
V2236B 100 OHM PT RTD, .1C/F
V2236C 10 OHM CU RTD, .1C/F

2.2.13 4 Plus Scanner Board -- 4 Plus RTD Panel Assembly

The 4 Plus Scanner board (P/N U0933) provides relay switching of voltages. It is part of the 4 Plus RTD panel assembly (P/N *), which contains:

- The Terminal mounting panel (P/N J7370)
- The 4 Plus Scanner board (P/N U0933)
- The 4 Plus RTD power board (P/N U0985)
- The RTD board (P/N U0996)

The 4 Plus RTD panel assembly is on the rear of the unit. Look for the mounting panel with a blue label and the words RTD PLUS. The 4 Plus Scanner board is between the RTD board and the 4 Plus RTD power board.

CAUTION:

This board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- Phillips screwdriver
- Regular screwdriver
- Anti-static ground strap

Procedure:

1. Open the front door and turn the power switch off.

2. Remove the four screws that secure the Terminal mounting panel. Remove the RTD panel assembly.

3. Disconnect the ribbon cable from J26 (lower left corner of 4 Plus Scanner board--on your right).

4. Remove the two screws from the 4 Plus RTD power board.

5. Disconnect the ribbon cable that extends from the bottom of the 4 Plus RTD power panel to J27 (center of 4 Plus Scanner board).

6. Disconnect the ribbon cable that extends from the top of the 4 Plus RTD power board to J28 (center of RTD board). Remove the RTD board.

7. Remove the two hex standoffs and one screw that secure the 4 Plus Scanner board. Remove the board.

8. Select the same bank on the two pin jumper (lower left corner of replacement board) as the original board. Reassemble the unit with the replacement board.

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*V2236A 100 OHM PT RTD, .01C
V2236B 100 OHM PT RTD, .1C/F
V2236C 10 OHM CU RTD, .1C/F

2.2.14 Operator Panel Board

The Operator Panel board (P/N U0945) interfaces with the 4 Plus DA board and allows you to program and review data. It is inside the front door behind the Control panel.

Equipment Required:

- Phillips screwdriver
- Allen wrench set
- Anti-static ground strap

Procedure:

1. Open the front door and turn the power switch off.

2. Remove the two screws that secure the beeper support bar (upper left corner inside front door). Remove the beeper. Remove the wires from the two wire clips.

3. Slide the chassis forward. Remove the five screws that secure the cover plate (left side of chassis). Remove the cover plate.

4. Disconnect the ribbon cable from J4 (top right of board).

5. Disconnect the Control panel ribbon cable (left side of board).

6. Feel behind the bottom inside edge of the lower inside door rim for three holes in the sheet metal frame. Punch the gasket material at these points to access the bottom mounting screws of the Operator panel board.

7. Remove the six screws that secure the Operator panel board. Remove the board.

8. Reassemble the unit with the replacement board. Turn the system on before you tighten the screws to make sure that all lights are working.

CAUTION:
When you reconnect the ribbon cable to the 4 Plus DA board, route it between the side plate and the 4 Plus DA board battery. The cable will be damaged when the door is fully open if you pinch it between the battery and the cover plate.

2.3 Digi-Link 4 Plus Board Exchange

This section describes exchange procedures for the following boards:

2.3.1 4 Plus DA
2.3.2 4 Plus Analog
2.3.3 Interface
2.3.4 Master Relay
2.3.5 Serial I/O
2.3.6 Power Supply
2.3.7 4 Plus Scanner (Analog Panel)
2.3.8 UTR
2.3.9 Status Sense, Status Termination
2.3.10 RTD
2.3.11 4 Plus RTD Power
2.3.12 4 Plus Scanner (RTD Panel)
2.3.13 Operator Panel
2.3.14 24 V power supply

Individual procedures list the equipment you need and special precautions you should observe. In addition, observe the precautions on page 2-1.

See Figures 2-3 and 2-4 on the following pages to reference board locations. The individual procedures indicate the location of connectors, jumpers and DIP switches. The location (right, left, center, top or bottom of board) assumes that you are removing the board. When the board is removed from the unit, the orientation changes and in some cases the right/left or top/bottom reference is reversed. However, all connectors, jumpers and DIP switches are labelled.

See Appendix B for schematics and wiring diagrams.

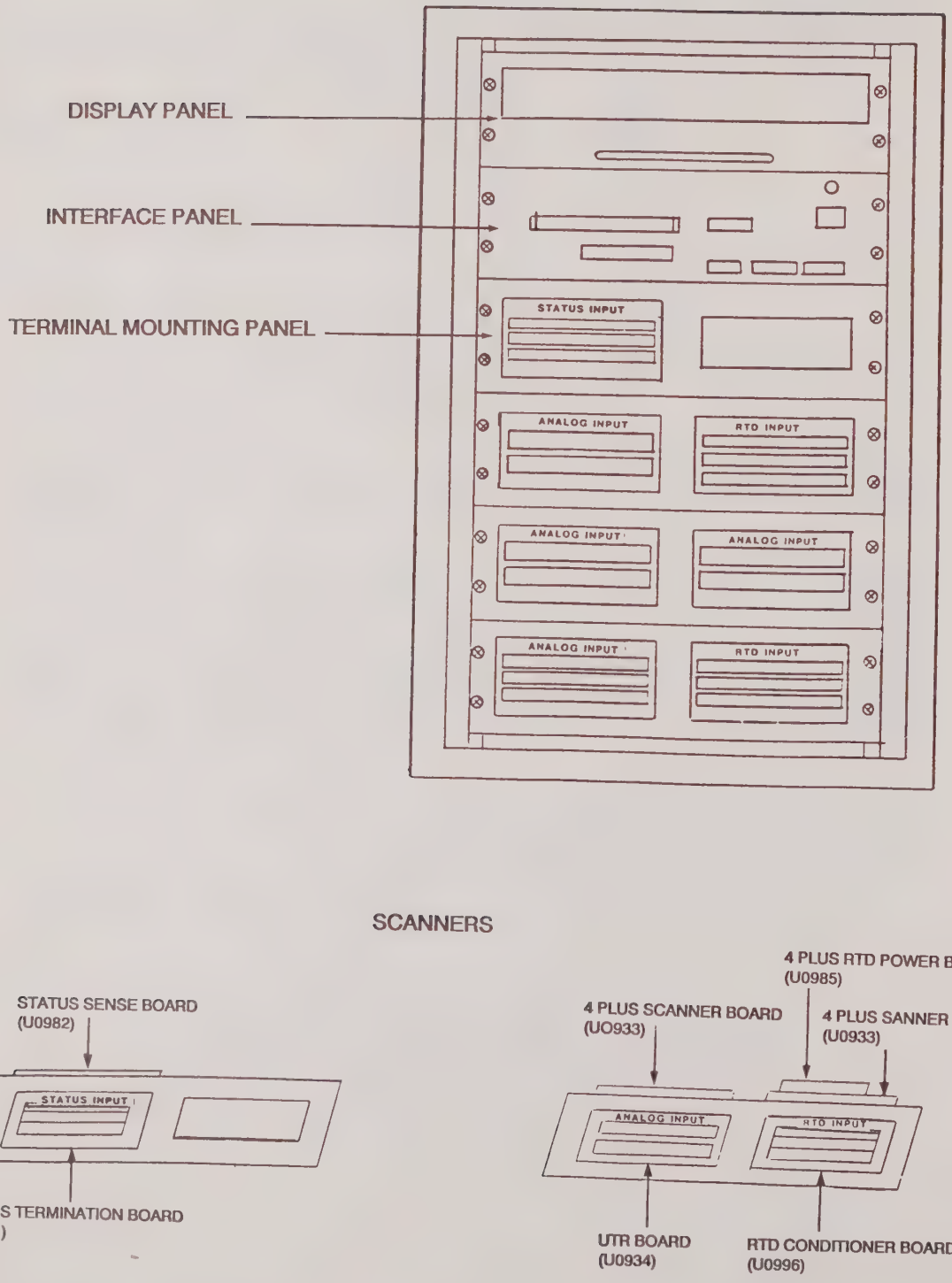
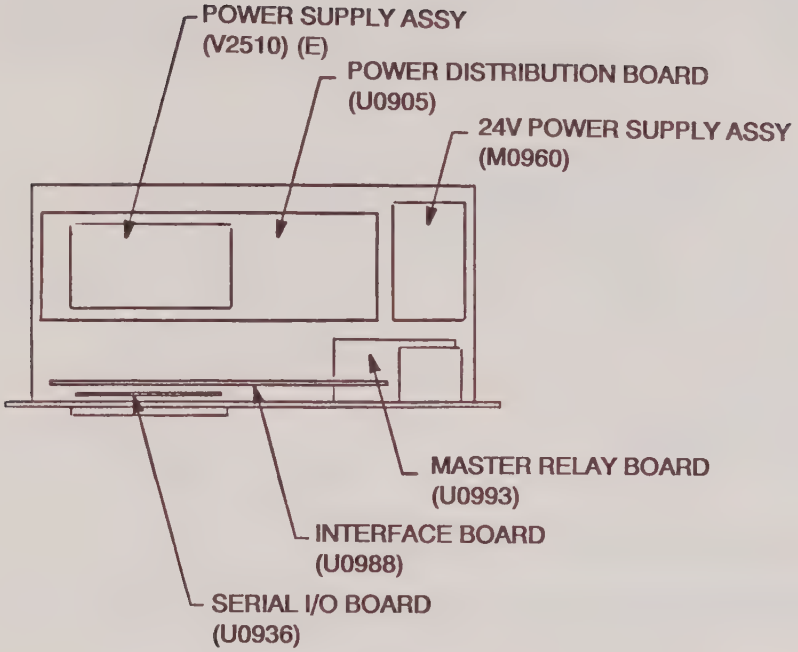
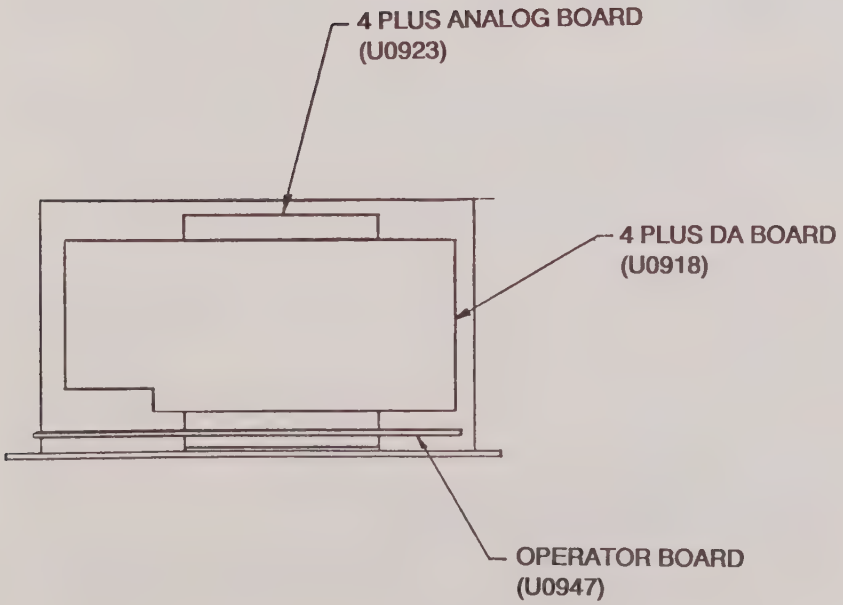


Figure 2-3. Digi-Link 4 Plus (Front view)



TOP VIEW
INTERFACE PANEL
ASSY



TOP VIEW
DISPLAY PANEL
ASSY

Figure 2-4. Digi-Link 4 Plus (Top view of boards)

2.3.1 4 Plus DA Board

The 4 Plus DA board (P/N U0918) controls the operation of the Digi-Link 4 Plus. It contains a microprocessor, memory storage capacity and some of the unit's I/O signal circuitry. The 4 Plus DA board is mounted behind the Display Panel Assembly.

CAUTION:

This board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- Phillips screwdriver
- Anti-static ground strap

Procedure:

1. Eliminate all external power to the system.
2. Remove the four screws that secure the display panel and slide display panel forward.
3. Disconnect connectors J1, J2 and J3 (right of board) and J4 (front left).
4. Remove the five mounting screws. Remove the board.
5. Set DIP switches S1 and S2 on the replacement board to match the original board.
6. Reassemble the unit with the replacement board. You must connect J3 before you connect J2.
7. Initialize* the system. Reprogram** the Digi-Link 4 Plus.

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* To reinitialize the system:
  - Power down the system.
  - Place the jumper (right front corner of 4 Plus DA board) in the INITLZ position (two left pins).
  - Restore power to the system.
  - Place the jumper in the NORMAL position (two right pins).

See Section 2.1.6 of the User's Manual for more information.

** To offload and load programs with a CPL-2, see the documentation supplied with the recorder or Appendix A of the User's Manual.

2.3.2 4 Plus Analog Board

The 4 Plus Analog board (P/N U0923) is a digital voltmeter that measures analog input. It is under the 4 Plus DA board.

CAUTION:

This board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- Phillips screwdriver
- Anti-static ground strap

Procedure:

1. Eliminate all external power to the system.

2. Remove the four screws that secure the display panel and slide display panel forward.

3. Disconnect connectors J1, J2 and J3 (right of board) and J4 (front left) from the 4 Plus DA board.

4. Remove the four mounting screws that secure the metal shield located under the 4 Plus DA board. Lift off metal shield with 4 Plus DA board mounted. This allows access to the 4 Plus Analog board.

5. Disconnect the ribbon cables from J2 and J26 (left rear of 4 Plus Analog board).

6. Remove the four screws that secure the 4 Plus Analog board to the display panel. Remove the board.

7. Set the Dip switches on the replacement 4 Plus DA board to match those of the original board.

8. Reassemble the unit with the replacement board.

2.3.3 Interface Board

The Interface board (P/N U0988) controls communications with external devices and is mounted behind the Interface panel. The Interface panel is mounted below the Display Panel assembly.

WARNING:

The relay output connector on the Interface panel may emit dangerous, user-supplied voltages when the power is off.

CAUTION:

This board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- Phillips screwdriver
- Anti-static ground strap

Procedure:

1. Eliminate all external power to the system.

2. Disconnect the power cord. Remove the four mounting screws that secure the Interface panel and slide panel forward. The Interface board is behind the panel.

3. Disconnect J3 left of power supply and J21 right of power supply. Remove the Interface Panel.

4. Disconnect the four-wire cable from J10 (right side of board).

5. Disconnect the ribbon cables from J1 and J11 (bottom of board) and J13 (top of board).

   If you have a Status Input board, disconnect the ribbon cable from J12 (top of board).

6. Remove the six screws that secure the board. Remove the board.

7. Reassemble the unit with the replacement board.

2.3.4 Master Relay Board

The Master Relay board (P/N U0993) contains the odd, even and watch dog relays, the RS-232 communications connector, and the RC-8R connector. It is behind the right side of the Interface panel. The Interface panel is mounted below the Display panel assembly.

WARNING:
The relay output connector on the Interface panel may emit dangerous, user-supplied voltages when the power is off.

CAUTION:
This board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- Phillips screwdriver
- 3/16" nut driver
- Anti-static ground strap

Procedure:

1. Eliminate all external power to the system (including any power to the relay contacts and status input terminals).

2. Remove the orange relay output connector (lower right side of Interface panel).

3. Remove the two hex standoffs that secure the RS-232 connector to the Interface panel (left of RC-8R connector).

4. Remove the four mounting screws that secure the Interface panel. Slide the panel forward.

5. Disconnect the ribbon cable from J11 (bottom of Interface board).

6. Remove the two screws on top of the Master Relay board.

7. Remove the Master Relay board.

8. Reassemble the unit with the replacement board.

2.3.5 Serial I/O Board

The Serial I/O board (P/N U0936) contains the unit's serial input/output screw terminal connectors. It is behind the input/output terminals on the left side of the Interface panel. The Interface panel is mounted below the display panel assembly.

WARNING:

The relay output connector on the Interface panel may emit dangerous, user-supplied voltages when the power is off.

CAUTION:

This board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- Phillips screwdriver
- Anti-static ground strap

Procedure:

1. Eliminate all external power to the system.
2. Remove any connections from the input/output terminals.
3. Remove the four mounting screws that secure the Interface panel. Slide the panel forward.
4. Disconnect the ribbon cable from J13 (top of Interface board).
5. Remove the three screws that secure the input/output terminal blocks.
6. Tip the top edge of the Serial I/O board forward and lift out.
7. Set the DIP switch slides on replacement board to match the original board.
8. Reassemble the unit with the replacement board. Reattach any connections to the input/output terminals.

2.3.6 Power Supply Assembly*

The power supply assembly (P/N V2510--115 V, V2510E--230 V) is a switching power supply that operates over a wide range of input voltages to provide a constant output voltage. It located behind the Interface panel and mounted on top of the Power Distribution board.

Kaye factory adjusts all replacement power supplies before shipment and they normally need no further adjustment during installation.

CAUTION:

This board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- Phillips screwdriver
- Anti-static ground strap

Procedure:

1. Eliminate all external power to the system.

2. Remove the four mounting screws that secure the Interface panel and slide the panel forward. Disconnect the cables from J3 (left of Power Distribution board) and J21 (right of Power Distribution board). Remove the Interface panel.

3. Disconnect the cables from J24 (right) and J25 (left) of Power Distribution board.

4. Remove the four screws that secure the corners of the power supply assembly. Hold the board by the edges and lift it off the standoffs. Do not touch any components.

5. Make sure input line voltage switches S1 and S2 (Power Distribution board) are set for 115 volts (domestic use) or 230 volts (foreign use).

6. Reassemble the unit with the replacement board. Do not disturb wires around the power supply.

---

* To remove the power supply assembly and the Power Distribution board (P/N U0905), complete steps 1 through 4, then:

- Disconnect the AC cable from J20 and the DC cable from J10 (bottom of Power Distribution board).
- Remove the four screws from the corners of the Power Distribution board. Then complete steps 5 and 6 above.

2.3.7 4 Plus Scanner Board -- 4 Plus Analog Panel Assembly

The 4 Plus Scanner board (P/N U0933) provides for relay switching of analog inputs such as thermocouples and voltages. It is part of the 4 Plus Analog panel assembly (P/N V2222), which contains:

- The terminal mounting panel (P/N J7370)
- The UTR board (P/N U0934)
- The 4 Plus Scanner board (P/N U0933)

The 4 Plus Analog panel assembly is located below the Interface panel assembly. Look for the mounting panel with a black label and the words ANALOG PLUS. The 4 Plus Scanner board is behind the 4 Plus Analog panel assembly.

Because the 4 Plus Scanner board is separate from the the Terminal mounting panel, you do not have to disconnect analog inputs when you exchange the 4 Plus Scanner board.

WARNING:
The relay output connector on the Interface panel may emit dangerous, user-supplied voltages when the power is off.

CAUTION:
This board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- Phillips screwdriver
- Anti-static ground strap

Procedure:

1. Eliminate all external power to the system.
2. Eliminate any voltage to the analog inputs.
3. Remove the four screws that secure the 4 Plus Analog Scanner Assembly to the Scanner Mounting panel. Bring the scanner assembly forward.
4. Disconnect the ribbon cable J26 (lower right corner of 4 Plus Scanner board).
5. Remove the three screws that secure the 4 Plus Scanner board to the terminal mounting panel. Unplug the 4 Plus Scanner board from the UTR board.
6. Select the same bank on the two pin jumper (lower left corner of replacement board) as the original board.
7. Reassemble the unit with the replacement board.

2.3.8 UTR Board

The UTR board (P/N U0934) provides ambient temperature reference for each 4 Plus Analog panel assembly. It is part of the 4 Plus Analog panel assembly (P/N V2222), which contains:

- The Terminal mounting panel (P/N J7370)
- The UTR board (P/N U0934)
- The 4 Plus Scanner board (P/N U0933)

The 4 Plus Analog panel assembly is located below the Interface panel assembly. Look for the mounting panel with a black label and the words ANALOG PLUS. The UTR board is directly behind the Terminal mounting panel.

WARNING:
The relay output connector on the Interface panel may emit dangerous, user-supplied voltages when the power is off.

CAUTION:
This board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- Phillips screwdriver
- Anti-static ground strap

Procedure:

1. Eliminate all external power to the system.

2. Eliminate any voltage to the analog inputs and disconnect the field wiring.

3. Remove the four screws that secure the Analog Scanner assembly to the Scanner mounting panel. Bring the Scanner assembly forward.

4. Remove the three screws that secure the 4 Plus Scanner board to the terminal mounting panel. Unplug the 4 Plus Scanner board form the UTR board.

5. Reassemble the unit with the replacement board. Restore voltage to the analog inputs.

2.3.9 Status Sense Board

The Status Sense board (P/N U0982) measures digital inputs from external devices. It is part of the Status Sense panel assembly (P/N V2226L), which contains:

- The Status Terminal mounting panel (P/N J7980)
- The Status Termination board (P/N U0981)
- The Status Sense board (P/N U0982)

The Status Sense panel assembly is located below the Interface panel assembly. Look for the mounting panel with a red label and the words STATUS INPUT. The Status Sense board is at the back of the Status Sense panel assembly.

WARNING:

The relay output connector on the Interface panel may emit dangerous, user-supplied voltages when the power is off.

CAUTION:

This board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- Phillips screwdriver
- Regular screwdriver
- Anti-static ground strap

Procedure:

1. Eliminate all external power to the system (including any voltage to the status inputs).

2. Remove the four screws that secure the Status Sense panel assembly to the Scanner Mounting panel. Disconnect the ribbon cable from J12. Remove the panel assembly.

3. Remove the two screws that secure the Status Sense board to the mounting panel.

4. Carefully pry J29 and J30 to separate it from the Status Termination board. Remove the Status Sense board.

5. Select the same bank on the two pin jumper as the original board.

6. Reassemble the unit with the replacement board. Restore voltage to the status inputs.

2.3.10 RTD Board

The RTD board (P/N U0996) contains the bridge completion resistors and also provides input terminals for termination of external RTD's. It is part of the 4 Plus RTD panel assembly (P/N*), which contains:

- The Terminal mounting panel (P/N J7370)
- The RTD board (P/N U0996)
- The 4 Plus RTD power board (P/N U0985)
- The 4 Plus Scanner board (P/N U0933)

The 4 Plus RTD panel assembly is located below the Interface panel assembly. Look for the mounting panel with a blue label and the words RTD PLUS. The RTD board is directly behind the Terminal mounting panel.

Equipment Required:

- Phillips screwdriver
- Anti-static ground strap

Procedure:

1. Eliminate all external power to the system (including any voltage to the status inputs).

2. Remove any external input connections.

3. Remove the four screws that secure the terminal blocks to the terminal mounting panel.

4. Pull the terminal blocks forward. Disconnect the ribbon cable from J28 (center of RTD board) and remove the board.

5. Reassemble the unit with the replacement board. Reattach any external input connections.

---

*V2236A 100 OHM PT RTD, .01C
V2236B 100 OHM PT RTD, .1C/F
V2236C 10 OHM CU RTD, .1C/F

2.3.11 4 Plus RTD Power Board

The 4 Plus RTD power board (P/N U0985) provides excitation to the RTD board. It is part of the 4 Plus RTD panel assembly (P/N *), which contains:

- The Terminal mounting panel (P/N J7370)
- The RTD board (P/N U0996)
- The 4 Plus RTD power board (P/N U0985)
- The 4 Plus Scanner board (P/N U0933)

The 4 Plus RTD panel assembly is located below the Interface panel assembly. Look for the mounting panel with a blue label and the words RTD PLUS. The 4 Plus RTD power board is at the back of the 4 Plus RTD panel assembly.

CAUTION:

This board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- Phillips screwdriver
- Anti-static ground strap

Procedure:

1. Eliminate all external power to the system.

2. Remove the four screws that secure the 4 Plus RTD Scanner assembly to the Scanner Mounting panel. Bring panel forward.

3. Disconnect the ribbon cable J26 (lower right corner of the 4 Plus Scanner board).

4. Remove the two screws from the 4 Plus RTD power board.

5. Disconnect the ribbon cable that extends from the bottom of the RTD power panel to J27 (center of 4 Plus Scanner board).

6. Disconnect the ribbon cable that extends from the top of the 4 Plus RTD power board to J28 (center of RTD board). Remove the 4 Plus RTD Power board.

7. Reassemble the unit with the replacement board. It is easier if you connect J27 first. Place the cable on the connector and then carefully press it to the RTD board with a screwdriver.

---

*V2236A 100 OHM PT RTD, .01C
V2236B 100 OHM PT RTD, .1C/F
V2236C 10 OHM CU RTD, .1C/F

2.3.12 4 Plus Scanner Board -- 4 Plus RTD Panel Assembly

The 4 Plus Scanner board (P/N U0933) provides relay switching of voltages. It is part of the 4 Plus RTD panel assembly (P/N *), which contains:

- The Terminal mounting panel (P/N J7370)
- The RTD board (P/N U0996)
- The 4 Plus RTD power board (P/N U0985)
- The 4 Plus Scanner board (P/N U0933)

The 4 Plus RTD panel assembly is located below the Interface panel. Look for the mounting panel with a blue label and the words RTD PLUS. The 4 Plus Scanner board is between the RTD board and the 4 Plus RTD power board.

CAUTION:
This board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- Phillips screwdriver
- Anti-static ground strap

Procedure:

1. Eliminate all external power to the system.

2. Remove the four screws that secure the 4 Plus RTD Scanner assembly to the 4 Plus Scanner Mounting panel. Bring the panel forward. Disconnect the ribbon cable from J26 (right corner of 4 Plus Scanner board).

3. Remove the two screws from the 4 Plus RTD power board. Disconnect the ribbon cable that extends from the bottom of the 4 Plus RTD power panel to J27 (center of 4 Plus Scanner board).

4. Disconnect the ribbon cable that extends from the top of the 4 Plus RTD power board to J28 (center of RTD board). Remove the 4 Plus RTD power board.

5. Remove the two hex standoffs and two screws that secure the 4 Plus Scanner board to the Terminal mounting panel. Remove the board.

6. Select the same bank on the two pin jumper (lower left corner of replacement board) as the original board.

7. Reassemble the unit with the replacement board.

*V2236A 100 OHM PT RTD, .01C; V2236B 100 OHM PT RTD, .1C/F; V2236C 10 OHM CU RTD, .1C/F

2.3.13 Operator Panel Board

The Operator Panel board (P/N U0947) interfaces with the 4 Plus DA board and allows you to program and review data. It is behind the Display panel.

Equipment Required:

- Phillips screwdriver
- Allen wrench set
- Anti-static ground strap

Procedure:

1. Eliminate all external power to the system.

2. Remove the four screws that secure the Display panel assembly. Slide panel forward.

3. Disconnect J1 (right rear of board) and J3 (right front of board) from the 4 Plus DA board. Disconnect J21 (right left of board) and J26 (center rear of board) from the 4 Plus Analog board. Remove Display panel.

4. Disconnect the ribbon cable J4 (left front of 4 Plus DA board).

5. Disconnect the cable (with blue connector) from the right of the Display panel.

6. Remove the six screws that secure the Operator Panel board. Remove the board.

7. Reassemble the unit with the replacement board.

2.3.14 24 Volt Power Supply

The 24 volt power supply (P/N M0960) provides power for the status inputs. The 24 volt power supply is mounted on the Interface panel.

WARNING:
The relay output connector on the Interface panel may emit dangerous, user-supplied voltages when the power is off.

CAUTION:
This board contains static sensitive components. Before you remove it, touch the Digi 4 Plus chassis to drain off any static charge on your body. Use an anti-static ground strap and always handle the board only by the edges. Transport and store it in a protective anti-static bag.

Equipment Required:

- Phillips screwdriver
- Anti-static ground strap

Procedure:

1. Eliminate all external power to the system.

2. Disconnect the power cord. Remove the four mounting screws that secure the Interface panel and slide panel forward.

3. Disconnect J3 left of system power supply and J21 right of system power supply. Remove the Interface Panel.

4. Disconnect the cables at the front and rear of the 24 volt power supply. (Do not confuse the 24 volt power supply with the system power supply. The 24 V power supply is located to the right of the system power supply.)

5. Remove the four screws that secure the 24 volt power supply to the Interface panel and remove the 24 volt power supply.

6. Reassemble the unit with the replacement power supply.

SECTION 3 - PRINTER MAINTENANCE

3.1 General Information

Although the Digistrip 4 Plus printer provides long term, reliable operation, you may have to make periodic adjustments or replace components.

Section 3.2 describes adjustment procedures.

Section 3.3 describes exchange procedures.

Each section conbtains a diagram to reference component locations.

Individual procedures list the equipment you need and special precautions you should observe. In addition, observe the following precautions for all adjustments and exchanges:

- Eliminate any external power source.
- Turn the power switch off.
- Touch the chassis to drain any static charge from your body.
- Use an anti-static ground strap.
- Keep your fingers away from the printhead if it is moving.
- Avoid touching, soiling, or otherwise damaging the timing fence.

3.2 Adjustment Procedures

This section describes adjustment procedures for the following components:

3.2.1 Fence Detector
3.2.2 Carriage Motor
3.2.3 Platen
3.2.4 Tractor Width
3.2.5 Tractor Belt
3.2.6 Timing Fence

Individual procedures list the equipment you need and special precautions you should observe. In addition, observe the precautions on page 3-1.

If the text references an exchange procedure in Section 2, do not begin the procedure until you read the general information for that section.

See Figure 3-1 below to reference component locations. See Appendix B for schematics and wiring diagrams.

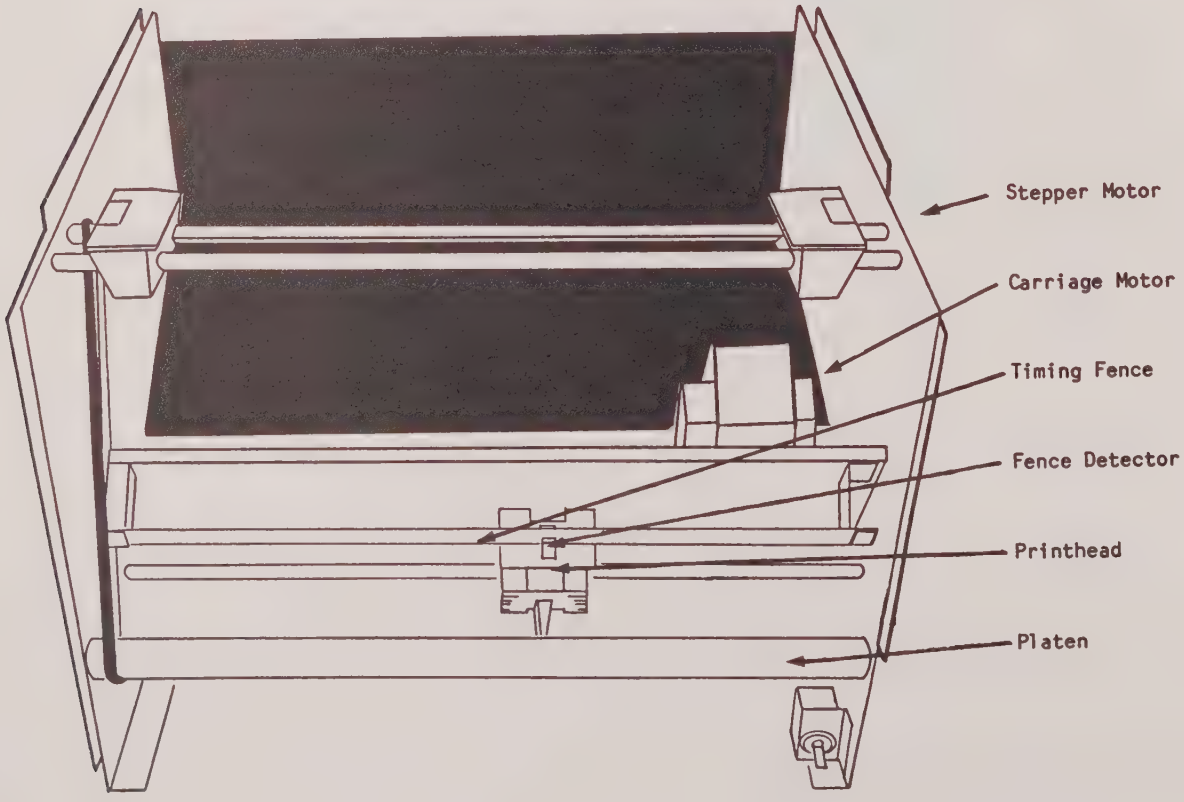


Figure 3-1. Digistrip 4 Plus Printer (Interior View)

3.2.1 Fence Detector

The fence detector scans the timing fence as the printhead moves across the page and transmits timing signals to the Print Control with Trending board. The fence detector is on top of the printhead.

Equipment Required:

- Phillips screwdriver
- Small screwdriver
- Oscilloscope
- X 10 probe

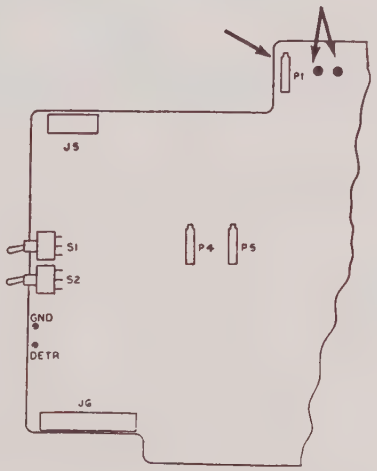
Procedure:

1. Open the front door and slide the chassis forward.

2. Remove the five screws that secure the cover plate to the Print Control with Trending board (right side of chassis). Remove the plate.

3. Place the printer in the test mode*.

4. Connect the oscilloscope's ground lead to the GND test point on the Print Control board. Touch the oscilloscope's probe to the DETR test point on the Print Control board (both front center of board). See Figure 3-2 at right.



5. Set the oscilloscope to register an amplitude of 0.5V/division and a time base of 2MS/division.

6. Watch the oscilloscope screen for a timing pulse sine wave with a hysteresis point on the center horizontal line. When you have adjusted the timing pulse properly, the portions of the wave above and below the hysteresis point should be the same, approximately 1.0 V. Figure 3-3 on the following page shows a properly adjusted timing pulse.

---

* To place the printer in the test mode:
  - Set S1 up and hold S2 up (both on front center of Print Control board).
  - Turn the power switch on.
  - Release switch S2. It will return to the down position. The printer will print a continuous test sequence.

See Section 2.1.8 of the User's Manual for more information.

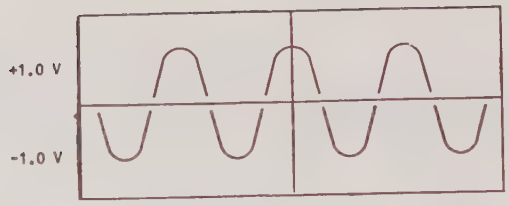


Figure 3-3. Properly Adjusted Timing Pulse

7. Adjust the set screw on P1 (upper left corner of board) to provide the proper timing pulse. Turn it clockwise to decrease the amplitude of the sine wave; turn it counterclockwise to increase the amplitude.

   After you complete the adjustment, momentarily lift S2 to end the test mode.

8. Reassemble the unit.

3.2.2 Carriage Motor

The carriage motor guides the printhead back and forth across the page. It is under the upper paper tray near the right side of the chassis.

CAUTION:
Avoid touching, soiling, or otherwise damaging the timing fence.

Equipment Required:

- Allen wrench set
- Phillips screwdriver
- Regular screwdriver
- Feeler Gauge

Procedure:

1. Open the front door and turn the power switch off.
2. Slide the chassis forward. Remove the paper.
3. Remove the two mounting screws that secure the upper paper tray. Remove the tray, rear edge first.
4. Remove the four mounting screws that secure the paper guide. Remove the guide.
5. Remove the ground strap (green wire at top left of chassis).
6. Remove the screws at either end of the platen. Remove the platen.
7. Remove the four nuts from the carriage motor mounting bracket (right side of chassis). Move the assembly forward.
8. Push the carriage motor to the right to tighten the chain drive; push it to the left to loosen the chain drive.
9. Reassemble the unit. Set the platen at .018" on both sides. (See Section 3.2.3 for the procedure.)

3.2.3 Platen

The platen is the rotating cylindrical surface that the printhead strikes. It is directly in front of the paper guide.

Equipment Required:

- Allen wrench set
- Phillips screwdriver
- Regular screwdriver
- Feeler gauge

Procedure:

1. Open the front door and turn the power switch off.

2. Slide the chassis forward. Remove the paper.

3. Loosen the left platen screw. Insert the feeler gauge between the printhead and the platen.

4. Turn the left platen screw until the distance between the platen and the printhead is .018". Tighten the screw to increase the distance; loosen it to decrease the distance.

5. Loosen the right platen screw. Insert the feeler gauge between the printhead and the platen.

6. Turn the right platen screw until the difference between the platen and the printhead is .018". Tighten the screw to increase the distance; loosen it to decrease the distance.

7. Repeat steps 3 and 4.

8. Reassemble the unit.

3.2.4 Tractor Width

The tractor drive assembly holds and guides the paper. It is above and behind the paper guide.

Equipment Required:

- None

Procedure:

1. Open the front door and turn the power switch off.

2. Slide the chassis forward. Make sure the paper is centered between the paper feed clips on the bottom of the paper guide.

3. Pull the small lever on the clip at the right side of the tractor drive assembly forward. Move the tractor drive to the right or left until both clips are the proper distance apart. Push the lever back.

4. Reassemble the unit.

3.2.5 Tractor Belt

The tractor belt regulates the paper feed. It is at the top right of the Digistrip 4 Plus as you slide the chassis forward.

CAUTION

Avoid touching, soiling, or otherwise damaging the timing fence.

Materials Required:

- Allen wrench set

Procedure:

1. Open the front door and turn the power switch off.
2. Slide the chassis forward. Remove the Print Control with Trending board. (See Section 2.2.2 for the Print Control w/Trending procedure.)
3. Loosen the two screws that secure the tractor drive assembly (right side panel of chassis). Move the tractor drive assembly back to tighten the belt; move it forward to loosen the belt.
4. Reassemble the unit.

3.2.6 Timing Fence

The timing fence is a transparent plastic strip that controls the character printout timing. It is in the front interior of the chassis, under the upper paper guide.

CAUTION:
Avoid touching, soiling, or otherwise damaging the timing fence.

Equipment Required:

- Allen wrench set
- Phillips screwdriver
- Regular screwdriver

Procedure:

1. Open the front door and turn the power switch off.
2. Slide the chassis forward. Remove the paper.
3. Remove the two mounting screws that secure the upper paper tray. Remove the tray, rear edge first.
4. Remove the four mounting screws that secure the paper guide. Remove the paper guide.
5. Remove the ground strap (green wire at top left of chassis.)
6. Tighten or loosen the four screws (two on the left, two on the right) that secure the timing fence mounting brackets. When the timing fence is properly adjusted, the printhead's photo detector moves along the fence without touching it.
7. Reassemble the unit.

3.3 Exchange Procedures

This section describes exchange procedures for the following components:

3.3.1 Timing Fence
3.3.2 Printhead
3.3.3 Stepper Motor
3.3.4 Carriage Motor
3.3.5 Platen
3.3.6 Fence Detector

See Section 2.2.2 for the Print Control w/Trending board exchange procedure; and Section 2.2.8 for the Power Supply exchange procedure.

Individual procedures list the equipment you need and special precautions you should observe. In addition, observe the general precautions on page 3-1.

If the text references an exchange procedure in Section 2, do not begin the procedure until you read the general information for that section.

See Figure 3-4 below to reference component locations. See Appendix B for schematics and wiring diagrams.

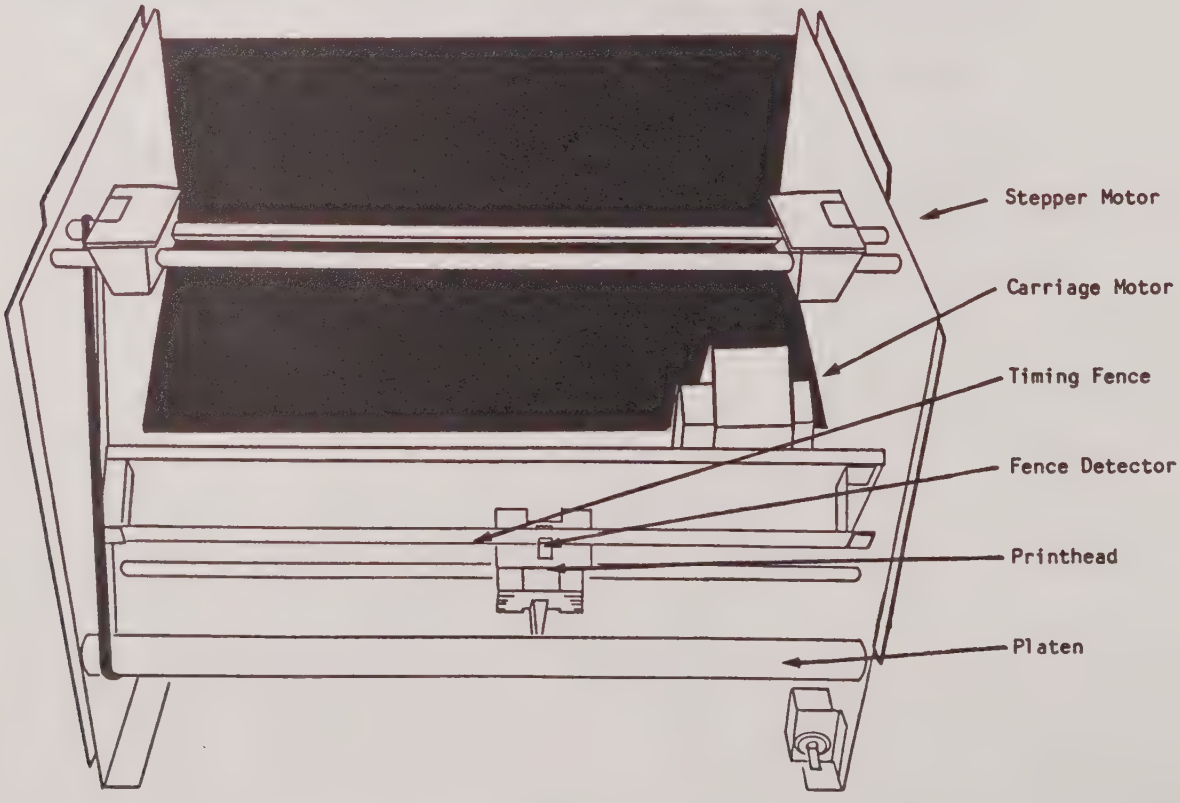


Figure 3-4. Digistrip 4 Plus Printer (Interior View)

3.3.1 Timing Fence

The timing fence is a transparent plastic strip that controls the character printout timing. It is in the front interior of the chassis, under the upper paper tray.

CAUTION:
Avoid touching, soiling, or otherwise damaging the timing fence.

Equipment Required:

- Allen wrench set
- Phillips screwdriver
- Regular screwdriver

Procedure:

1. Open the front door and turn the power switch off.

2. Slide the chassis forward. Remove the paper.

3. Remove the two mounting screws that secure the upper paper tray. Remove the tray, rear edge first.

4. Remove the four mounting screws that secure the paper guide. Remove the paper guide.

5. Remove the ground strap (green wire at top left of chassis.)

6. Loosen the four screws (two on the left, two on the right) that secure the timing fence mounting brackets. Remove the timing fence. Note its orientation. The line pattern is down and the clear section is on the right.

6. Remove the mounting brackets from the original timing fence and install them on the replacement.

7. Reassemble the unit with the replacement. Adjust the alignment and tension. (See Section 3.2.6 for the procedure.)

3.3.2 Printhead

The printhead is an electro-mechanical impact printing device that contains seven vertically aligned print hammers. As it moves back and forth across the page, the print hammers create the characters when they strike the pressure sensitive paper. The printhead is under the upper paper tray, on top of the carriage shafts.

CAUTION:

Avoid touching, soiling, or otherwise damaging the timing fence.

Equipment Required:

- Allen wrench set
- 1/4" nut driver
- Phillips screwdriver
- Regular screwdriver

Procedure:

1. Open the front door and turn the power switch off.
2. Slide the chassis forward. Remove the paper.
3. Remove the two mounting screws that secure the upper paper tray. Remove the tray, rear edge first.
4. Remove the four mounting screws that secure the paper guide. Remove the paper guide.
5. Remove the ground strap (green wire at top left of chassis).
6. Remove the Print Control board. (See Section 2.2.2 for the Print Control w/Trending procedure.)
7. Remove the four retaining rings from the carriage shafts (two on the left, two on the right). Slide the carriage shafts to the right.
8. Slide the printhead off the carriage bars and out of the unit.
9. Disconnect the ribbon cables from J6 and J15 (on printhead). Note their orientation. Improper installation can cause permanent damage to the printhead.
10. Reassemble the unit with the replacement.

3.3.3 Stepper Motor

The stepper motor powers the tractor drive, which feeds the paper through the printer. It is on the right side panel of the chassis.

Equipment Required:

- Allen wrench set
- 1/4" nut driver
- Phillips screwdriver
- Regular screwdriver

Procedure:

1. Open the front door and turn the power switch off.

2. Slide the chassis forward. Remove the Print Control board. (See Section 2.2.2 for the Print Control w/Trending procedure.)

3. Loosen the set screw on the pulley. Remove the pulley and drive belt.

4. Loosen the two motor mounting screws that secure the tractor drive (right side panel of chassis). Remove the stepper motor.

5. Reassemble the unit with the replacement. Make sure you leave a small amount of play in the drive belt.

3.3.4 Carriage Motor

The carriage motor powers the print assembly. It is under the upper paper tray near the right side of the chassis.

CAUTION:

Avoid touching, soiling, or otherwise damaging the timing fence.

Equipment Required:

- Allen wrench set
- 1/4" nut driver
- 11/32" nut driver
- Phillips screwdriver
- Regular screwdriver
- Molex pin extractor
- Feeler gauge

Procedure:

1. Open the front door and turn the power switch off.
2. Slide the chassis forward. Remove the paper.
3. Remove the two mounting screws that secure the upper paper tray. Remove the tray, rear edge first.
4. Remove the four mounting screws that secure the paper guide. Remove the paper guide.
5. Remove the ground strap (green wire at top left of chassis).
6. Remove the screws at either end of the platen. Lift out the platen.
7. Remove the Print Control board. (See Section 2.2.2 for the Print Control w/Trending procedure.)
8. Remove the four retaining rings from the carriage shafts (two on the left, two on the right). Slide the carriage shafts to the right. The carriage motor is near the right side of the chassis.
9. Disconnect the carriage motor power cable (upper right front corner of chassis) from J33 (four-pin Molex connector at lower right rear corner of power supply). Remove the connector with the Molex pin extractor. Note its orientation.
10. Loosen the carriage motor mounting screws. Remove the drive chain from the drive gear.
11. Remove the carriage motor. Remove the connector from the replacement motor and attach the old connector.
12. Reassemble the unit with the replacement. Set the platen at .018" on both sides. (See Section 3.2.3 for the procedure.)

3.3.5 Platen

The platen is the rotating cylindrical surface that the printhead strikes. It is directly in front of the paper guide.

Equipment Required:

- Allen wrench set
- Phillips screwdriver
- Regular screwdriver
- Feeler gauge

Procedure:

1. Open the front door and turn the power switch off.

2. Slide the chassis forward. Remove the paper.

3. Remove the ground strap (green wire at top left of chassis).

4. Remove the screws at either end of the platen. Lift out the platen.

5. Reassemble the unit with the replacement. Set the platen at .018" on both sides. (See Section 3.2.3 for the procedure.)

3.3.6 Fence Detector

The fence detector scans the timing fence as the printhead moves across the page and transmits timing signals to the Print Control board. The fence detector is on top of the printhead.

CAUTION:

Avoid touching, soiling, or otherwise damaging the timing fence.

Equipment Required:

- Phillips screwdriver
- Small screwdriver

Procedure:

1. Open the front door and turn the power switch off.
2. Slide the chassis forward. Remove the paper.
3. Remove the two mounting screws that secure the upper paper tray. Remove the tray, rear edge first.
4. Remove the four mounting screws that secure the paper guide. Remove the guide.
5. Remove the ground strap (green wire at top left of chassis).
6. Remove the two screws on top of the printhead. Remove the fence detector.
7. Reassemble the unit with the replacement.

SECTION 4 - TROUBLESHOOTING

4.1 General Information

This section describes the isolation and correction of problems at the circuit board and mechanical assembly level.

Section 4.2 contains a Digistrip 4 Plus diagnostic table that lists possible problems, probable sources, and references test procedures to correct the problems.

Section 4.3 describes these procedures. It also contains diagrams to reference board locations.

Section 4.4 contains a Digi-Link 4 Plus diagnostic table that lists possible problems, probable sources, and references test procedures to correct the problems.

Section 4.5 describes these procedures. It also contains diagrams to reference board locations.

Individual procedures list the equipment you need and special precautions you should observe. In addition, observe the following precautions for all troubleshooting:

- Eliminate any external power source. to the system. This includes any power to the relay contacts and status input terminals.
- Touch the chassis to drain any static charge from your body.
- Use an anti-static ground strap.
- Handle boards only by the edges.
- Transport and store boards in anti-static bags.

4.2 Digistrip 4 Plus Diagnostic Table

Table 4-1 lists possible operating problems, probable sources, and references diagnostic procedures to correct the problems.

Locate the problem in the first column; read across the table to find the probable sources; then refer to the section that contains the procedures to correct the problem.

Table 4-1. Digistrip 4 Plus Troubleshooting Diagnostics

Problem	Probable Sources	Reference
Printhead will not move	Platen Carriage motor Fence detector Print Control board Power supply	4.3.1
Printhead moves erratically and/or squeaks	Carriage motor	4.3.2
Printhead moves to one side and stops	Print Control board Power supply 4 Plus DA board	4.3.3
Printhead moves back and forth continuously	Fence detector Print Control board	4.3.4
Printhead tears paper	Printhead assembly Platen Print Control board	4.3.5
Printhead moves but paper does not advance	Stepper motor Print Control board Power supply	4.3.6
Printout appears backward and/or is indistinct	Print Control board Paper	4.3.7
Printout is missing parts of lines and/or contains incorrect characters	Print Control board Fence detector	4.3.8
Printout is missing parts of characters	Printhead assembly Print Control board	4.3.9
Digi is completely inoperative	Power supply 4 Plus DA board Print Control board	4.3.10

Table 4-1. Digistrip 4 Plus Troubleshooting Diagnostics (Continued)

Problem	Probable Sources	Reference
Power fails intermittently	AC line voltage Power supply 4 Plus DA board	4.3.11
Main fuse blows repeatedly	Carriage motor Power supply	4.3.12
One or more parts of the display panel are inoperative	4 Plus DA board Operator Panel board	4.3.13
One or more control panel keys are inoperative	Control panel 4 Plus DA board	4.3.14
Digi gains or loses time and/or loses program information	4 Plus DA board Power supply	4.3.15
All system input values are over range or open	4 Plus Analog board 4 Plus Scanner board 4 Plus DA board	4.3.16
Some system input values are over range or open	4 Plus Analog board 4 Plus Scanner board	4.3.17
System input values drift	4 Plus Analog board 4 Plus Scanner board UTR board 4 Plus RTD panel assembly	4.3.18
System input values are incorrect	4 Plus Analog board 4 Plus Scanner board UTR board	4.3.19
Even and/or odd master relays do not operate properly	Programming 4 Plus DA board Master Relay board Interface board	4.3.20

4.3 Digistrip 4 Plus Troubleshooting Diagnostics

This section describes procedures to isolate and correct the following problems:

4.3.1 Printhead Will Not Move
4.3.2 Printhead Moves Erratically and/or Squeaks
4.3.3 Printhead Moves to One Side and Stops
4.3.4 Printhead Moves Back and Forth Continuously
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Each procedure lists the equipment you need and special precautions you should observe. In addition, observe the precautions on page 4-1.

If the text references an adjustment or exchange procedure in Sections 2 or 3, do not begin the procedure until you read the precautions in the general information for that section.

See Figures 4-1 and 4-2 on the following pages to reference board and component locations. See Appendix B for schematics and wiring diagrams.

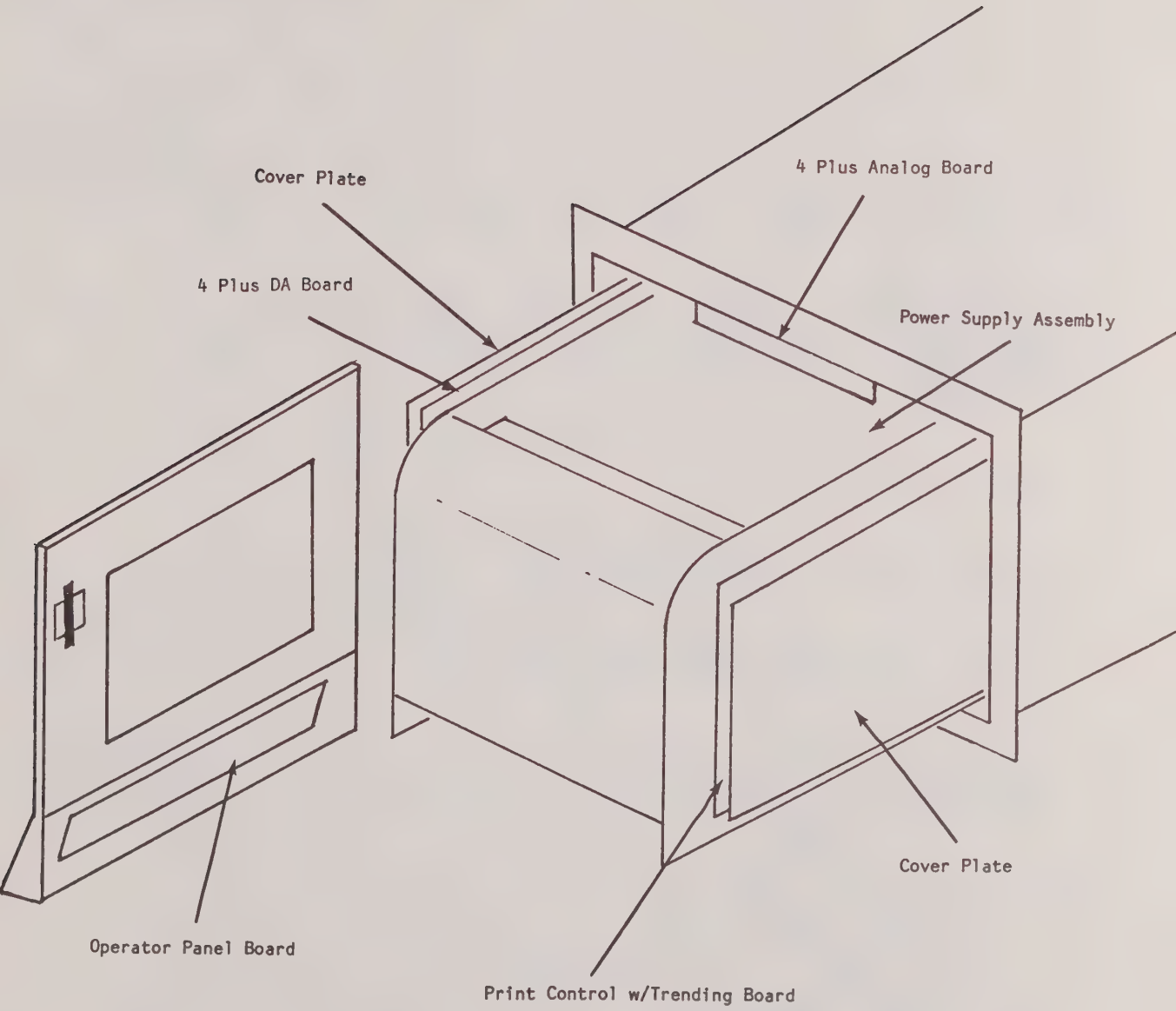


Figure 4-1. Digistrip 4 Plus (Front Interior View)

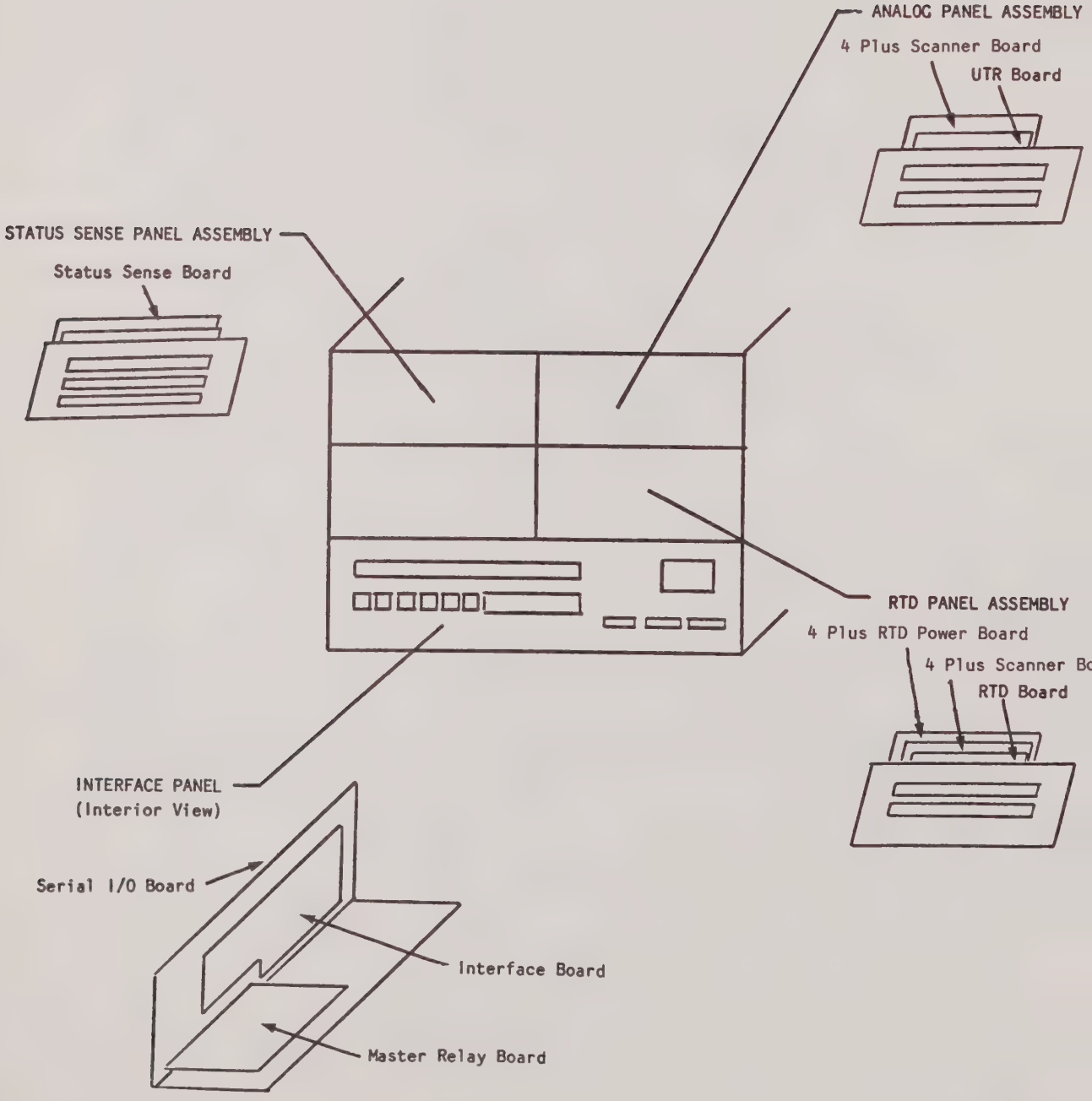


Figure 4-2. Digistrip 4 Plus (Rear View)

4.3.1 Printhead Will Not Move

Equipment Required:

- Allen wrench set
- Phillips screwdriver
- Regular screwdriver
- 1/4" nut driver
- Volt/ohm meter

Procedure:

1. Open the front door and turn the power switch off.

2. Slide the chassis forward. Remove the paper from the printer.

3. Remove the mounting screws that secure the upper paper tray. Remove the tray, rear edge first.

   If the printhead seems to be jammed against the platen, check the printhead-to-platen clearance. If necessary, adjust or replace the platen. (See Section 3.2.3 for the adjustment procedure; see Section 3.3.5 for the exchange procedure.)

   If the printhead still will not move after you adjust or replace the platen, go to step 4.

4. Adjust the fence detector. (See Section 3.2.6 for the procedure.)

5. Remove the mounting screws that secure the paper guide. Remove the paper guide.

6. Disconnect the carriage motor power cable (upper right front corner of chassis) from J33 (four-pin Molex connector at lower right rear corner of power supply).

7. Connect the lead wires of the volt/ohm meter to the yellow and blue wire pins on the Molex connector. The reading should be 10-15 ohms. Then connect the lead wires to the red wire and black wire pins. The reading should be 15-20 ohms.

   If both readings are within range, go to step 8.

   If either reading is below range, replace the carriage motor. (See Section 3.3.4 for the procedure.)

8. Reconnect J33. Make sure the printhead drive assembly is properly installed and adjusted. (See Section 3.2.2 for the procedure.)

9. Turn the power switch on. Check the Print Control board with the volt/ohm meter for the voltages listed below.

Test Point	Board Location	Voltage Reading
+24V	Upper front	+24.0VDV (unregulated)
+5V	Upper front	+5.0VDC (±0.2V)
+12V	Upper rear	+12.0VDC (±1.2V)
-12V	Upper rear	-12.0VDC (±1.2V)

If the readings are within range and the printhead moves, go to step 10.

If the readings are within range but the printhead still does not move, replace the Print Control board. (See Section 2.2.2 for the Print Control w/Trending board procedure.)

If the readings are not within range, replace the power supply. (See Section 2.2.8 for the procedure.)

10. Reassemble the unit.

4.3.2 Printhead Moves Erratically and/or Squeaks

Adjust the Carriage motor. (See Section 3.2.2 for the procedure.)

4.3.3 Printhead Moves to One Side and Stops

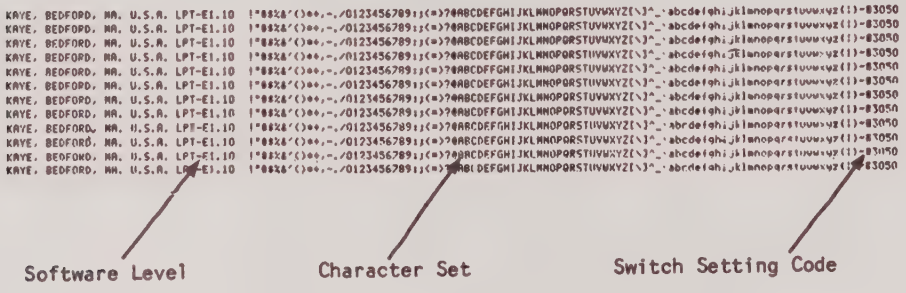
Equipment Required:

- Oscilloscope
- Phillips screwdriver
- Volt/ohm meter
- Small adjustment screwdriver

Procedure:

1. Open the front door and turn the power switch off.

2. Slide the chassis forward. Set S1 up and hold S2 up (both front of Print Control board) Turn the power switch on. Release S2. The Digi should print a test pattern like the one below.



If the test pattern is satisfactory, go to step 3.

If the test pattern is not satisfactory, adjust the timing fence. (See Section 3.2.6 for the procedure.)

- If the test pattern is not satisfactory after you adjust the timing fence, replace the Print Control board. (See Section 2.2.2 for the Print Control w/Trending board procedure.)

3. Make sure the power switch is on. Check the Print Control board with the volt/ohm meter for the voltages listed below.

Test Point	Board Location	Voltage Reading
+24V	Upper front	+24.0VDC (unregulated)
+5V	Upper front	+5.0VDC (±0.2V)
+12V	Upper rear	+12.0VDC (±1.2V)
-12V	Upper rear	-12.0VDC (±1.2V)

If the readings are within range, replace the 4 Plus DA board. (See Section 2.2.1 for the procedure.)

If the readings are not within range, replace the power supply. (See Section 2.2.8 for the procedure.)

4. Reassemble the unit.

4.3.4 Printhead Moves Back and Forth Continuously

Equipment Required:

- Phillips screwdriver
- Regular screwdriver

Procedure:

1. Open the front door and turn the power switch off and on.

   If the printhead moves back and forth across the page once, prints a restart message and stops, discontinue the procedure.

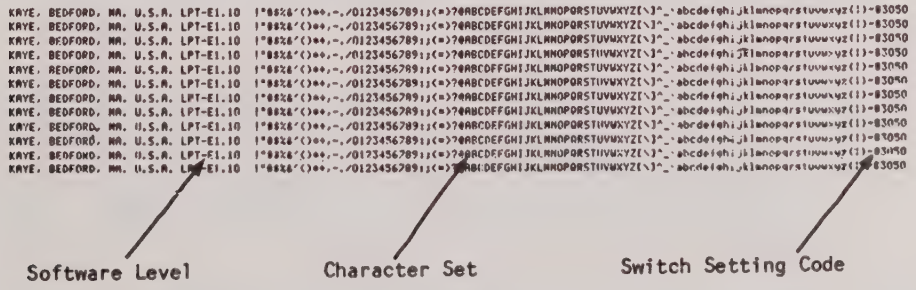
   If the printhead still moves back and forth continuously, go to step 2.

2. Slide the chassis forward. Adjust the set screw on P1 (upper middle of Print Control board). First turn it clockwise until it clicks. The click indicates the end of the adjustment range. Then turn the set screw counterclockwise eight complete revolutions to set it at the approximate center of its adjustment range. Gradually turn it clockwise to stop the continuous printhead movement.

   If the adjustment stops the printhead movement, go to step 3.

   If the printhead still moves back and forth continuously, replace the Print Control board. (See Section 2.2.2 for the Print Control w/Trending board procedure.) If the printhead moves back and forth continuously after you replace the Print Control board, replace the fence detector. (See Section 3.3.6 for the procedure.)

3. Set S1 up and hold S2 up (both front of Print Control board). Turn the power switch on. Release S2. The Digi should print a test pattern like the one below.



4. When the printer is operating properly, discontinue the test mode. Turn the power switch off and on, to return the printer to normal operations.

5. Reassemble the unit.

4.3.5 Printhead Tears Paper

Equipment Required:

- Allen wrench set
- Phillips screwdriver
- Regular screwdriver
- 1/4" nut driver
- Feeler gauge
- Flashlight

Procedure:

1. Open the front door and turn the power switch off.

2. Slide the chassis forward. Remove the paper from the printer.

3. Aim the flashlight at the printhead from above and check the printhead for protruding print hammers (thin wires).

   If any hammers protrude, replace the printhead. (See Section 3.3.2 for the procedure.)

   If no hammers protrude, momentarily turn the power switch on so the printhead moves to one end of the carriage and stops. Turn the power switch off.

4. Check the printhead-to-platen clearance with the feeler gauge.

   If the clearance is not .018", adjust the platen. (See Section 3.2.3 for the procedure.)

5. Check the printing face of the platen to make sure it is clean and smooth.

   If it is dirty or rough, remove the platen and rub the printing face with crocus cloth or fine steel wool. Reinstall the platen.

6. Reload the paper.

   If the printhead still tears the paper, move the printhead to the middle of the carriage by hand. Use the feeler gauge to check the printhead-to-platen clearance for a platen warp.

   - If the clearance is not .018", replace the platen. (See Section 3.3.6 for the procedure.)

   - If the clearance is .018" but the printhead still tears the paper, replace the Print Control board. (See Section 2.2.2 for the Print Control w/Trending board procedure.)

7. Reassemble the unit.

4.3.6 Printhead Moves But Paper Does Not Advance

Equipment Required:

- Allen wrench set
- Phillips screwdriver
- Regular screwdriver
- 1/4" nut driver
- Volt/ohm meter

Procedure:

1. Open the front door and turn the power switch off.

2. Slide the chassis forward. Adjust the Carriage motor. (See Section 3.2.2 for the procedure.)

3. Turn the power switch on.

   If the paper still does not advance, turn the power switch off.

4. Remove the cover plate from Print Control board (right side of chassis). Make sure all connectors at the rear of the board are securely fastened.

5. Check the Print Control board with the volt/ohm meter for the voltages listed below.

Test Point	Board Location	Voltage Reading
+24V	Upper front	+24.0VDV (unregulated)
+5V	Upper front	+5.0VDC (±0.2V)
+12V	Upper rear	+12.0VDC (±1.2V)
-12V	Upper rear	-12.0VDC (±1.2V)

   If the readings are not within range, check fuse F9 (upper front of Print Control board) with the volt/ohm meter.

   - If the fuse has blown, replace it with a 1/4 amp Slo-Blo fuse.

   - If the fuse has not blown, replace the power supply. (See Section 2.2.8 for the procedure.)

6. Disconnect the stepper motor cable from J5 (top edge of Print Control board). Turn the power switch on. Check the fuse again.

   If the fuse has blown, replace the Print Control board. (See Section 2.2.2 for the Print Control w/Trending board procedure.)

   If the fuse has not blown but the paper still does not advance, replace the stepper motor. (See Section 3.3.1 for the procedure.)

7. Reassemble the unit.

4.3.7 Printout Appears Backward and/or Indistinct

Equipment Required:

- Phillips screwdriver

Procedure:

1. Open the front door and turn the power switch off.

   If the printout is backward:

   Slide the chassis forward. Remove the cover plate from the Print Control board (right side of chassis).

   Locate M 67 (center of board) and check the software level. Then contact Kaye.

   If the printout is indistinct after a few seconds:

   Make sure you loaded the paper properly with the words "Kaye Instruments" in the right margin.

2. Reassemble the unit.

4.3.8 Printout is Missing Parts of Lines and/or Contains Incorrect Characters

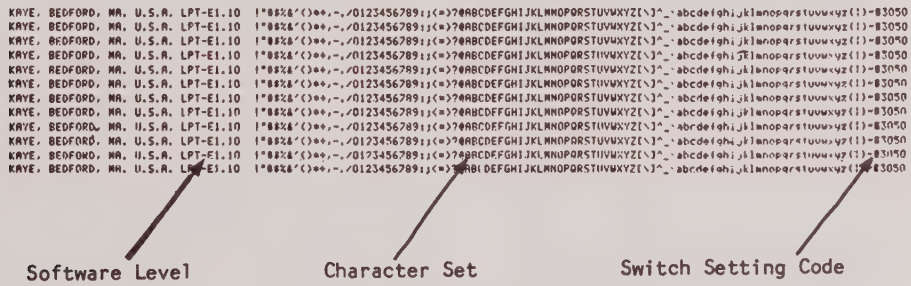
Equipment Required:

- Allen wrench set
- Phillips screwdriver
- Regular screwdriver
- Anti-static ground strap

Procedure:

1. Open the front door and turn the power switch off.

2. Slide the chassis forward. Set S1 up and hold S2 up (both front of Print Control board). Turn the power switch on. Release S2. The Digi should print a test pattern like the one below.



If the test pattern is not satisfactory, calibrate the Print Control board. (See Section 2.2.2 for the Print Control w/Trending board procedure.)

- If you cannot adjust the timing pulse properly, replace the Print Control board. (See Section 2.2.2 for the Print Control w/Trending board procedure.)

- If you can adjust the timing pulse properly but the printout is still missing parts of lines and/or contains incorrect characters, adjust the fence detector. Make sure that
  - The chain is not slipping
  - The timing fence is clean
  - The optical detector does not make contact with the timing fence

  If the printout is still missing parts of lines and/or contains incorrect characters after the adjustment, contact Kaye.

3. Reassemble the unit.

4.3.9 Printout is Missing Parts of Characters

Equipment Required:

- Allen wrench set
- Phillips screwdriver
- Regular screwdriver
- 1/4" nut driver
- Volt/ohm meter

Procedure:

1. Open the front door and turn the power switch off.

2. Slide the chassis forward. Remove the cover plate from the Print Control board (right side of chassis).

3. Check print hammer fuses F1-F8 (lower front corner of board) with the volt/ohm meter.

   If any fuses have blown, replace them with 1/4 amp Fast-Blo fuses.

4. Turn the power switch on. Check the fuses again.

   If any fuses have blown, replace the printhead. (See Section 3.3.2 for the procedure.)

   If no fuses have blown and the printout is satisfactory, go to step 5.

   If no fuses have blown but the printout is still missing parts of characters, check the printhead.

   - If any print hammers are either recessed or extruded, replace the printhead. (See Section 3.3.2 for the procedure.)

   - If no print hammers are either recessed or extruded, replace the Print Control board. (See Section 2.2.2 for the Print Control w/Trending board procedure.)

5. Reassemble the unit.

4.3.10 Digi is Completely Inoperative

Equipment Required:

- Allen wrench set
- Phillips screwdriver
- Regular screwdriver
- 1/4" nut driver
- Volt/ohm meter

Procedure:

1. Open the front door and turn the power switch off.

2. Check the main fuse (rear of unit).

   If it has blown, replace it with a 1.5 amp Slo-Blo fuse (1.0 amp Slo-Blo fuse with 230 VAC systems).

3. Turn the power switch on. Check the fuse again.

   If it has blown, go to Section 4.3.12 (Main Fuse Blows Repeatedly).

   If it has not blown but the Digi is still inoperative, go to step 4.

4. Turn the power switch off. Slide the chassis forward. Remove the paper from the printer.

5. Remove the mounting screws that secure the upper paper tray. Remove the tray, rear edge first.

6. Make sure all the connectors on the power supply (bottom rear) are properly aligned and fully seated.

7. Remove the cover plate from the 4 Plus DA board (left side of chassis). Turn the power switch on.

8. Connect the volt/ohm meter probe to the top of C9 (middle rear of board between J1 and J2) and the ground wire to the bottom of C9. The reading should be +5V (±0.1V).

   If the reading is within range and the Digi is still inoperative, replace the 4 Plus DA board. (See Section 2.2.1 for the procedure.)

   If the reading is not within range, turn the power switch off. Disconnect the ribbon cable from J3 (bottom rear of board). Turn the power switch on.

9. Connect the volt/ohm meter to +5V and the ground wire to the test points on the front of the Print Control board. The reading should be +5V (±0.1V).

If the reading is within range and the Digi is still inoperative, replace the Print Control board. (See Section 2.2.2 for the Print Control w/Trending board procedure.)

If the reading is not within range and the Digi is still inoperative, replace the power supply. (See Section 2.2.8 for the procedure.)

10. Reassemble the unit.

4.3.11 Power Fails Intermittently

Equipment Required:

- Allen wrench set
- Phillips screwdriver
- Regular screwdriver
- Volt/ohm meter

Procedure:

1. Open the front door and turn the power switch off.

2. Disconnect the power cord and connect other equipment to the same line.

   If the power still fails intermittently with this equipment, AC line voltage is causing the problem.

   If the power does not fail intermittently with this equipment, connect the power cord to the Digistrip 4 Plus and go to step 3.

3. Slide the chassis forward. Remove the cover plate from the 4 Plus DA board (left side of chassis). Turn the power switch on.

4. Connect the volt/ohm meter probe to the top of C9 (middle rear of board between J1 and J2) and the ground wire to the bottom of C9. The reading should be +5V (±0.1V).

   If the reading is irregular or not within range, replace the power supply. (See Section 2.2.8 for the procedure.)

   - If the power fails intermittently after you replace the power supply, replace the 4 Plus DA board. (See Section 2.2.1 for the procedure.)

5. Reassemble the unit.

4.3.12 Main Fuse Blows Repeatedly

Equipment Required:

- Allen wrench set
- Phillips screwdriver
- Regular screwdriver
- Volt/ohm meter

Procedure:

1. Open the front door and turn the power switch off.

2. Slide the chassis forward. Remove the paper from the printer.

3. Remove the mounting screws that secure the paper tray. Remove the tray, rear edge first.

4. Disconnect the carriage motor power cable (upper right front corner of chassis) from J33 (four-pin Molex connector at lower right rear corner of power supply).

5. Connect the volt/ohm meter lead wires to the yellow and blue wire pins. The reading should be 10-15 ohms. Then connect the lead wires to the red and black wire pins. The reading should be 15-20 ohms.

   If both readings are within range, replace the power supply. (See Section 2.2.8 for the procedure.)

   If either reading is not within range, replace the carriage motor. (See Section 3.3.5 for the procedure.)

6. Reconnect J33. Install a new 1.5 amp Slo-Blo fuse (1.0 amps for 230 VAC systems).

7. Reassemble the unit.

4.3.13 One or More Parts of the Display Panel are Inoperative

Equipment Required:

- Phillips screwdriver
- Regular screwdriver
- 1/4" nut driver

Procedure:

1. Open the front door and turn the power switch off.

2. Slide the chassis forward. Remove the cover plate from the 4 Plus DA board (left side of chassis).

3. Make sure both parts of J4 (upper front corner of board) are properly aligned and tightly fitted together.

   If one or more parts of the display panel are still inoperative, replace the Operator Panel board. (See Section 2.2.15 for the procedure.)

   - If one or more parts of the display panel are still inoperative after you replace the Operator Panel board, replace the 4 Plus DA board. (See Section 2.2.1 for the procedure.)

4. Reassemble the unit.

4.3.14 One or More Control Panel Keys are Inoperative

Equipment Required:

- Phillips screwdriver
- Regular screwdriver

Procedure:

1. Open the front door and turn the power switch off.

2. Disconnect the ribbon cable from the blue connector (inside right of door--on your left).

3. Peel the control panel (P/N M3103) from the front of the door and install a replacement. Make sure to realign the Control panel properly.

   If one or more control panel keys are still inoperative, follow steps 2 and 3 in Section 4.3.13 (One or More Parts of the Display Panel are Inoperative).

4. Reassemble the unit.

4.3.15 Digi Loses or Gains Time and/or Loses Program Information

Equipment Required:

- Phillips screwdriver
- Regular screwdriver
- 1/4" nut driver
- Volt/ohm meter

Procedure:

1. Open the front door and turn the power switch off.

2. Slide the chassis forward. Remove the cover plate from the 4 Plus DA board (left side of chassis).

3. Attach the positive lead of the volt/ohm meter to the top of the +3.6 V battery (lower front of board) and the negative lead to the bottom. The reading should be between +3.5 V and 4.5 V.

   If the reading is within range, replace the 4 Plus DA board. (See Section 2.2.1 for the procedure.)

   If the reading is not within range and the Digi has not been used for a period of time, turn the power on for 24 hours to recharge the battery.

   - If the reading is still not within range after recharging the battery, replace the battery*.

     - If the reading is still not within range after replacing the battery, replace the 4 Plus DA board. (See Section 2.2.1 for the procedure.)

5. Reassemble the unit.

---

* To replace the battery:
  - Turn the power switch off.
  - Remove the 4 Plus DA board. (See Section 2.2.1 for the procedure.)
  - Place the board face down on a non-conductive surface to remove the battery.
  - Solder the replacement battery from the bottom of the board.

4.3.16 All System Input Values are Over Range or Open

Equipment Required:

- Phillips screwdriver
- Regular screwdriver
- 1/4" nut driver
- 4-5 K ohm ¼ W resistor

Procedure:

1. Make sure the power switch is on.

2. Access Configuration Code 001. Make sure you assigned data from each Scanner to a different row of channels. For example, if you have three Scanners, assign a 1 to digit 1, a 2 to digit 2 and a 3 to digit 3. (See Section 11.1 of the User's Manual for more information.

3. Turn the power switch off. Access the 4 Plus Scanner boards. (See Section 2.2.9 for the procedure.) Check the bank select jumpers on each 4 Plus Scanner board (inside lower left corner of board--on your right) to make sure each setting is different. For example, bank 1, selector on #1; bank 2, selector on #2; bank 3, selector on #3.

4. Disconnect the ribbon cable from J26 (lower left corner of board) on all 4 Plus Scanner boards.

5. Place a 4-5 K ohm ¼ W resistor across the GND and the FLT IN test points of the 4 Plus Analog board (top front of case).

6. Turn the power switch on. Assign Function Code 001 (65 mV DVM measuring range) to Channel 101.

   If the reading at Channel 101 is still over range or open, replace the 4 Plus Analog board. (See Section 2.2.4 for the procedure.)

   - If the reading is still over range or open after you replace the 4 Plus Analog board, contact Kaye.

7. Reprogram Channel 101. Reassemble the unit.

4.3.17 Some System Input Values are Over Range or Open

Equipment Required:

- Phillips screwdriver
- Regular screwdriver
- 1/4" nut driver

Procedure:

1. Make sure the power switch is on.

2. Check the sensors on channels that are over range or open by placing them on channels that are correct. Replace any faulty sensors.

3. Generate a list program* of over range or open channels. Make sure all programmed instructions are complete and accurate.

4. Turn the power switch off. Connect jumper wires across the + and - input terminals of all channels that are over range or open.

5. Turn the power switch on. Assign Function Code 001 (65 mV DVM measuring range) to all channels that are over range or open. Access each channel.

   If the readings are not 00.000 mV (±.008 mV), replace that 4 Plus Scanner board. (See Section 2.2.9 for the procedure.)

   - If the readings are still over range or open after you replace the 4 Plus Scanner board(s), contact Kaye.

6. Reassemble the unit.

---

* To generate a listing of all channels:
  - Press the CHANNEL key.
  - Press the LIST PROGRAM key.
  - Press the ENTER key.

See Section 3.3 of the User's Manual for more information.

4.3.18 System Input Values Drift

Equipment Required:

- Phillips screwdriver
- Regular screwdriver
- 4-5 K ohm ¼ W resistor
- Volt/ohm meter

Procedure:

1. Make sure the power switch is on.

   If the inputs are RTD's:

   Place equivalent value resistors across the + and - input terminals of all channels that drift. Replace any faulty RTD's.

   If the readings still drift, check and, if necessary, calibrate the 4 Plus Analog board. (See Section 1.3 for the procedure.)

   - If you can adjust it properly, replace the 4 Plus RTD Panel Assembly. (See steps 1 and 2 of Section 2.2.13 for the procedure.)

   - If you cannot adjust it properly, replace the 4 Plus Analog board. (See Section 2.2.4 for the procedure.)

   If the inputs are thermocouples:

   Connect jumper wires across the + and - input terminals of all channels that drift.

   If the readings are room temperature, replace any faulty thermocouples.

   If the readings are not room temperature, access the UTR board (See Section 2.2.10 for the procedure). Check the two RTD leads that terminate on the board with the volt/ohm meter.

   - If the reading is between 100-120 ohms, replace the 4 Plus Scanner board. (See Section 2.2.9 for the procedure.)

   - If the reading is not between 100-120 ohms, replace the UTR board. (See Section 2.2.10 for the procedure.)

   If the inputs are voltages:

   Attach a verified voltage source to all channels that drift.

   - If channels still drift, go to the next step.

   - If channels do not drift, check input sensors. Replace any faulty sensors.

Open the front door and turn the power switch off. Disconnect the ribbon cable from J26 on all 4 Plus Scanner boards.

Turn the power switch on. Assign Function Code 001 (65 mV DVM measuring range) to Channel 101.

Turn the power switch off. Access the 4 Plus Analog board (top front of case). Place a 4-5 K ohm ¼ W resistor across the GND and the FLT IN test points (front of board).

Turn the power switch on. Access Channel 101.

If the reading is not 00.000 mV (±.008 mV), calibrate the 4 Plus Analog board. (See Section 1.3 for the procedure.)

- If you cannot calibrate it, replace the 4 Plus Analog board. (See Section 2.2.4 for the procedure.)

- If you can calibrate it but the reading is still not 00.000 mV (±.008 mV), contact Kaye.

If the reading is 00.000 mV (±.008 mV) but drifts by more than 8 counts, replace the 4 Plus Analog board. (See Section 2.2.4 for the procedure.)

- If the data values still drift after you replace the 4 Plus Analog board, contact Kaye.

If the reading is 00.000 (±.008 mV) mV and does not drift, replace the 4 Plus Scanner board. (See Section 2.2.9 for the procedure.)

Reprogram Channel 101.

2. Reassemble the unit.

4.3.19 System Input Values are Incorrect

Equipment Required:

- Phillips screwdriver
- Regular screwdriver
- Volt/ohm meter

Procedure:

1. Make sure the power switch is on.

2. Generate a list program* of all channels. Make sure all programmed instructions are complete and accurate.

   If the inputs are all RTD's:

   If the readings are still incorrect, check and, if necessary, calibrate the 4 Plus Analog board. (See Section 1.3 for the procedure.)

   - If you cannot adjust it properly, replace the 4 Plus Analog board. (See Section 2.2.4 for the procedure.)

   - If you can adjust it properly but the system input values are still incorrect, contact Kaye.

   If the inputs are all thermocouples:

   Make sure the red lead is connected to the - input terminal of all channels that are incorrect.

   If the readings are still incorrect, connect jumpers across the + and - input terminals.

   - If the readings are room temperature, replace any faulty thermocouples.

   - If the readings are not room temperature, check and, if necessary, calibrate the 4 Plus Analog board. (See Section 1.3 for the procedure).

     - If you cannot adjust it properly, replace the 4 Plus Analog board. (See Section 2.2.4 for the procedure.)

---

* To generate a listing of all channels:
  - Press the CHANNEL key.
  - Press the LIST PROGRAM key.
  - Press the ENTER key.

See Section 3.3 of the User's Manual for more information.

- If you can adjust it properly, access the UTR board. (See Section 2.2.10 for the procedure.) Check the two RTD leads that terminate on the board with the volt/ohm meter.

  - If the reading is between 100-120 ohms, replace the 4 Plus Scanner board. (See Section 2.2.9 for the procedure.)

  - If the reading is not between 100-120 ohms, replace the UTR board. (See Section 2.2.10 for the procedure.)

If the inputs are voltages:

If the readings are still incorrect, attach a verified voltage source to the + and - input terminals of Channel 101 on the 4 Plus Scanner board.

Assign the Function Codes 001, 002 and 003 to Channel 101. Use the table below to determine the proper readings.

Function Code	Measuring Range	Verified Voltage Input	Reading
001	65 mV	30 mV	30.000 (±.008)
002	650 mV	300 mV	300.00 (±.08)
003	6.5 V	3 V	3.0000 (±.0004)

If one of the readings is not within range, calibrate the 4 Plus Analog board. (See Section 1.3 for the procedure.)

- If you cannot calibrate it, replace the 4 Plus Analog board. (See Section 2.2.4 for the procedure.)

- If you can calibrate it but one of the readings is still not within range, contact Kaye.

If all of the readings are within range, repeat the procedure on another 4 Plus Scanner board. If the readings are still within range, contact Kaye.

4.3.20 Even and/or Odd Master Relays Do Not Operate Properly

CAUTION:

This procedure involves setting and resetting the master relays. Be aware that you will turn your master relay activated devices on and off during this procedure.

Equipment Required:

- None

Procedure:

1. Make sure the power switch is on.

2. Access Configuration Code 007 to make sure you configured the system to turn the master relays on.

   As a default, digit 1 = 0 (odd master relay is turned on when any odd relay address is turned on) and digit 2 = 0 (even master relay is turned on when any even relay address is turned on).

   Use the following tables to determine the values of digits 1, 2 and 3. (See Section 7.2.2 of the User's Manual for more information.)

Digit 1 ODD Master Relay

Value	Relay Condition
0	Static operation while MRELAY at limit with odd relay address
1	Pulse when MTRIP at limit with odd relay address
2	Pulse when MRETURN at limit with odd relay address
3	Pulse when MTRIP or MRETURN at limit with odd relay address
4	Static operation while MRELAY at limit with non-zero relay address
5	Pulse when MTRIP at at limit with non-zero relay address
6	Pulse when MRETURN at limit with non-zero relay address
7	Pulse when MTRIP and MRETURN at limit with non-zero relay address

Digit 2 EVEN Master Relay

Value	Relay Condition
0	Static operation while MRELAY at limit with even relay address
1	Pulse when MTRIP at limit with even relay address
2	Pulse when MRETURN at limit with even relay address
3	Pulse when MTRIP or MRETURN at limit with even relay address
4	Static operation while MRELAY at limit with non-zero relay address
5	Pulse when MTRIP at at limit with non-zero relay address
6	Pulse when MRETURN at limit with non-zero relay address
7	Pulse when MTRIP and MRETURN at limit with non-zero relay address

Digit 3 Master Relays Normally Energized

Value	Relay Condition
0	Master relays normally de-energized
1	Master relays normally energized

If the master relay(s) are not operating after you check Configuration Code 007, go to step 3.

3. Enter the information in the following table to activate the odd master relay:

Channel	Function	Limit 1 Op-Codes
401	101	1 000000 2 100000 3 170000*
* Digits 1 and 2 can be any relays between 01 and 48. 17 arbitrarily selected.		

Key in CHANNEL 0 1 7. The display should show .017. (Dot indicates logic bit for relay 17 is on.)

Key in CHANNEL 0 4 9. The display should show .049. (Dot indicates odd master relay logic bit is on.)

Change Limit Op-Code 3 in the table to 180000 (Relay 18) and enter the information a second time to activate the even master relay.

Key in CHANNEL 0 1 8. The display should show .018. (Dot indicates logic bit for relay 18 is on.)

Key in CHANNEL 0 5 0. The display should show .050. (Dot indicates even master relay is on.)

If the master relay logic bits turn on with this procedure, program errors caused the problem. Generate a list program* of all channels. Check the Limit Op-Codes to make sure that you specified a relay address for digits 1 and 2 of Limit Op-Code 3. These digits specify the relay that the system activates. This relay, in turn, activates the master relay. Also make sure that you specified a 1 for digit 1 of Limit Op-Code 2. This digit signals the system to activate the relay you specified. (See Section 7.1 of the User's Manual for more information.)

If the master relay logic bits turn on, but the master relays are still not working, make sure the cables are properly connected.

- If the master relays are still not working after you check the cable connections, contact Kaye.

4. Reprogram Channel 401.

---

* To generate a listing of all channels:
  - Press the CHANNEL key.
  - Press the LIST PROGRAM key.
  - Press the ENTER key.

See Section 3.3 of the User's Manual for more information.

4.4 Digi-Link 4 Plus Diagnostic Table

Table 4-2 lists possible operating problems, probable sources, and references diagnostic procedures to correct the problems. Refer to the section that contains the procedures to correct the problem.

Table 4-2. Digi-Link 4 Plus Troubleshooting Diagnostics

Problem	Probable Sources	Reference
Digi is completely inoperative	Power supply 4 Plus DA board	4.5.1
Power fails intermittently	AC line voltage Power supply 4 Plus DA board	4.5.2
Circuit breaker trips repeatedly	Power supply	4.5.3
One or more parts of the display panel are inoperative	4 Plus DA board Operator Panel board	4.5.4
One or more control panel keys are inoperative	Control panel 4 Plus DA board	4.5.5
Digi gains or loses time &/ or loses program information	4 Plus DA board Power supply	4.5.6
All system inputs values over range or open	4 Plus Analog board 4 Plus Scanner board 4 Plus DA board	4.5.7
Some system inputs values over range or open	4 Plus Analog board 4 Plus Scanner board 4 Plus Analog board	4.5.8
System input values drift	4 Plus Analog board 4 Plus Scanner board UTR board 4 Plus RTD panel assembly	4.5.9
System input values are incorrect	4 Plus Analog board 4 Plus Scanner board UTR board	4.5.10
Even and/or odd relays do not operate properly	Programming 4 Plus DA board Master Relay board Interface board	4.5.11
24 volt power supply inoperative	24 volt power supply In-line fuse	4.5.12

4.5 Digi-Link 4 Plus Test Procedures

This section describes test procedures to isolate and correct the the following problems:

4.5.1 Digi is Completely Inoperative
4.5.2 Power Fails Intermittently
4.5.3 Circuit Breaker Trips Repeatedly
4.5.4 One or More Parts of the Display Panel are Inoperative
4.5.5 One or More Control Panel Keys are Inoperative
4.5.6 Digi Loses and/or Gains Time or Loses Program Information
4.5.7 All System Inputs Values are Over Range or Open
4.5.8 Some System Input Values are Over Range or Open
4.5.9 System Input Values Drift
4.5.10 System Input Values are Incorrect
4.5.11 Even and/or Odd Master Relays Do Not Operate Properly
4.5.12 24 Volt Power Supply Inoperative

Individual procedures list the equipment you need and special precautions you should observe. In addition, observe the precautions on page 4-1.

If the text references an adjustment or exchange procedure in Sections 2 or 3, do not begin the procedure until you read the precautions in the general information for that section.

See Figures 4-3 and 4-4 on the following pages to reference board and component locations. See Appendix B to reference schematics and wiring diagrams.

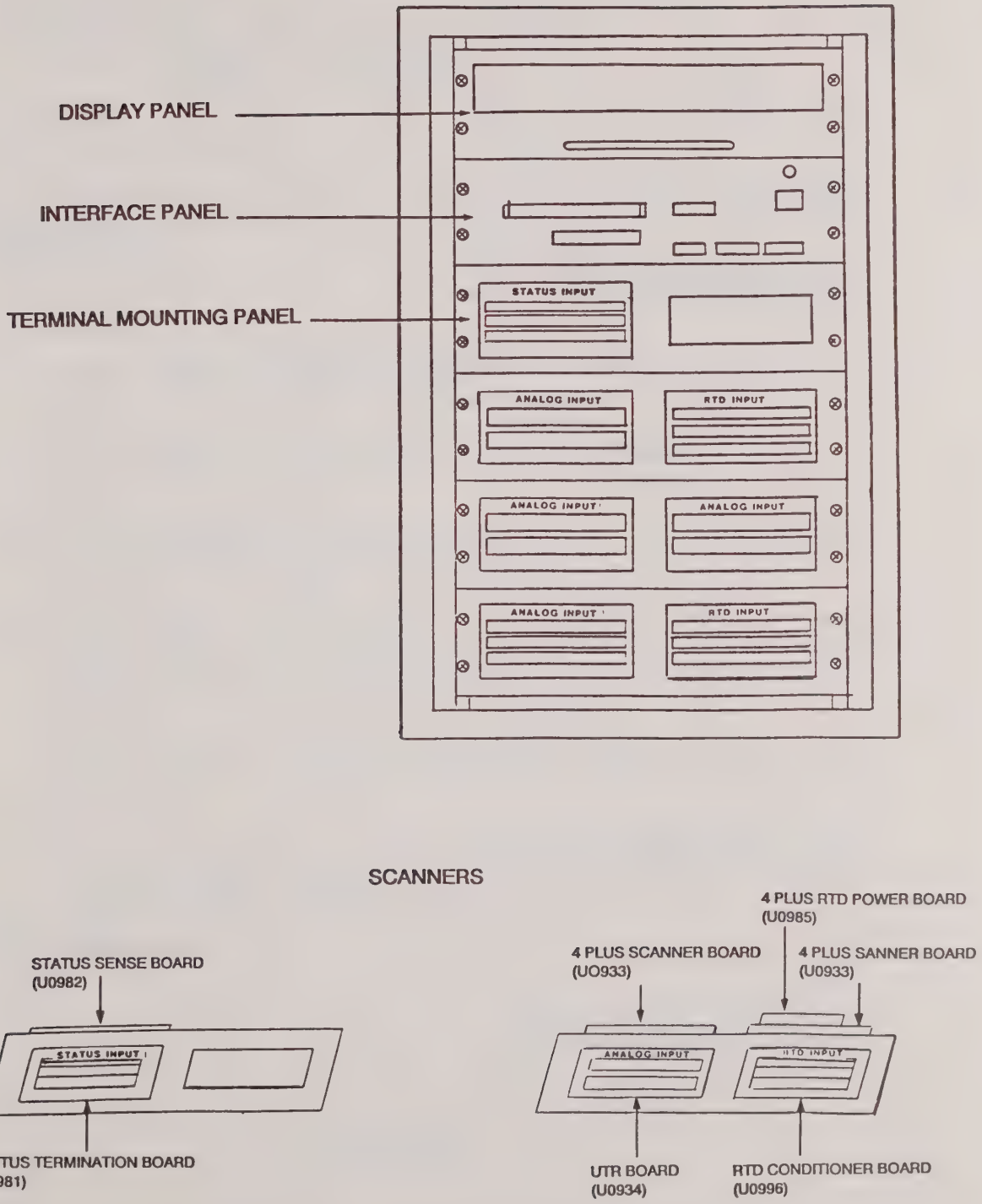
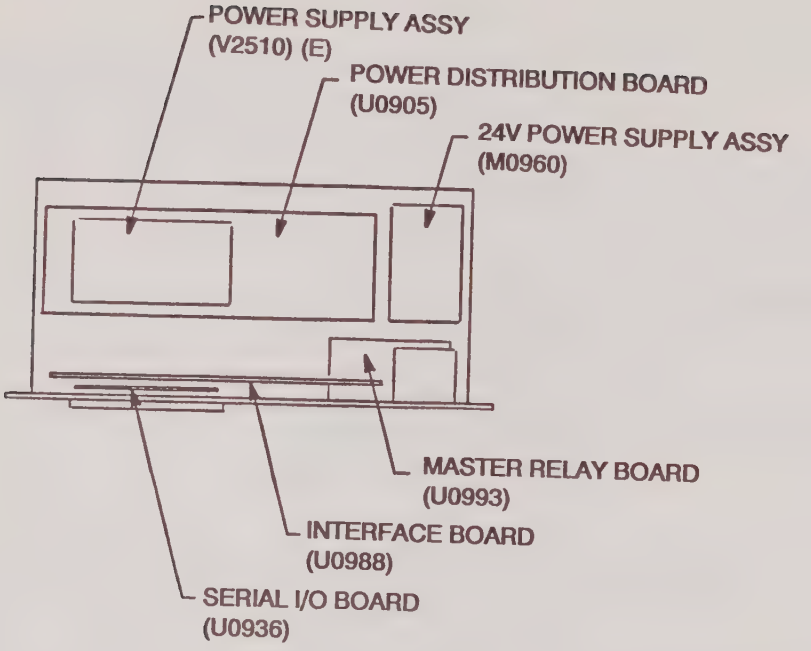
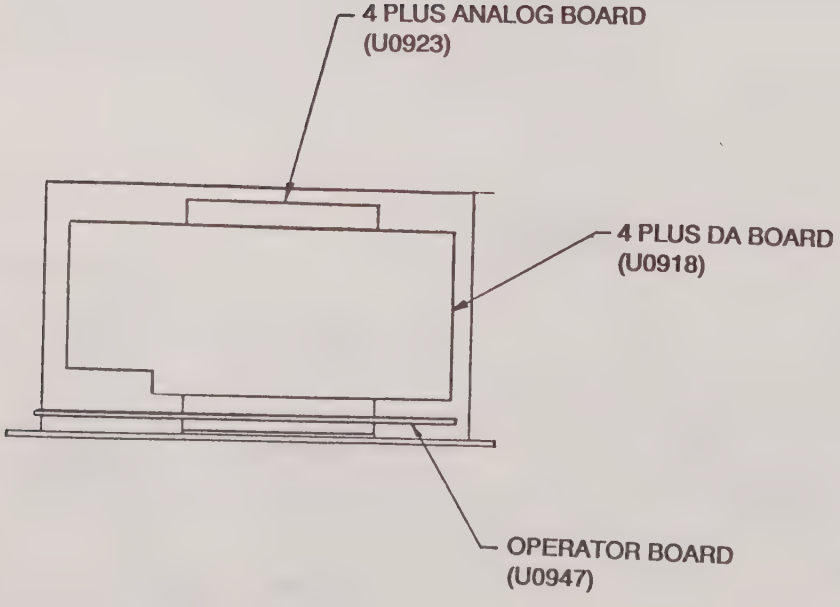


Figure 4-3. Digi-Link 4 Plus (Front view)



TOP VIEW
INTERFACE PANEL
ASSY



TOP VIEW
DISPLAY PANEL
ASSY

Figure 4-4. Digi-Link 4 Plus (Top view of boards)

4.5.1 Digi-Link is Completely Inoperative

Equipment Required:

- Phillips screwdriver
- Volt/ohm meter

Procedure:

1. Eliminate all external power to the system.

2. Check the circuit breaker (front right of Interface panel). If the circuit breaker is tripped (button out), reset it by pushing in the button.

3. Restore power to the system and check the circuit breaker again.

   If the circuit breaker is tripped, go to Section 4.5.3 (Circuit Breaker Trips Repeatedly).

   If the circuit breaker has not tripped, but the Digi is still inoperative, go to step 4.

4. Eliminate all external power to the system. Remove the Interface panel assembly. Make sure all connectors on the power supply (behind Interface panel) are properly aligned and fully seated.

5. Restore power to the system. Access the 4 Plus DA board (behind Display panel). Connect the voltmeter probe across C9 (right of board between J1 and J2). The reading should be +5V (±0.1V).

   If the reading is +5V (±0.1V) and the Digi is still inoperative, replace the 4 Plus DA board. (See Section 2.3.1 for the procedure.)

   If the reading is not +5V (±0.1V), and the Digi is still inoperative, replace the power supply. (See Section 2.3.6 for the procedure.)

6. Reassemble the unit.

4.5.2 Power Fails Intermittently

Equipment Required:

- Phillips screwdriver
- Volt/ohm meter

Procedure:

1. Eliminate power to the system. Connect other equipment to the same line.

   If the power still fails intermittently with this equipment, AC line voltage is causing the problem.

   If the power does not fail intermittently with this equipment, restore power to the Digi-Link 4 Plus and go to step 2.

2. Remove the Display panel assembly to access the 4 Plus DA board (behind Display panel).

3. Connect the voltmeter probe across C9 (right of board between J1 and J2). The reading should be +5V (±0.1V).

   If the reading is irregular or not within range, replace the power supply. (See Section 2.3.6 for the procedure.)

   - If the power fails intermittently after you replace the power supply, replace the 4 Plus DA board. (See Section 2.3.1 for the procedure.)

4. Reassemble the unit.

4.5.3 Circuit Breaker Trips Repeatedly

Equipment Required:

- Phillips screwdriver
- Volt/ohm meter

Procedure:

1. Eliminate all external power to the system.

2. Remove four screws that secure the Display panel assembly. Slide Display Panel assembly forward.

3. Disconnect the four wire cable from J21 on the 4 Plus Analog board (center rear of board).

4. Push in the circuit breaker reset button (right front of the Interface panel). Restore power to the system and check the circuit breaker again.

   If the circuit breaker has tripped again, replace the power supply. (See Section 2.3.6 for the procedure.)

   If the circuit breaker has not tripped, replace the 4 Plus Analog board. (See Section 2.3.2 for the procedure.)

5. Reconnect J21. Reassemble the unit.

4.5.4 One or More Parts of the Display Panel are Inoperative

Equipment Required:

- Phillips screwdriver

Procedure:

1. Eliminate all external power to the system.

2. Remove four screws that secure the Display panel assembly. Slide Display Panel assembly forward.

3. Make sure J4 (front left corner of data 4 board) is properly aligned and connected to both the 4 Plus DA board and the Operator panel board.

   If one or more parts of the display panel are still inoperative, replace the Operator Panel board. (See Section 2.3.13 for the procedure.)

   - If one or more parts of the display panel are still inoperative after you replace the Operator Panel board, replace the 4 Plus DA board. (See Section 2.3.1 for the procedure.)

4. Reassemble the unit.

4.5.5 One or More Display Panel Keys are Inoperative

Equipment Required:

- Phillips screwdriver

Procedure:

1. Eliminate all external power to the system.

2. Remove the four screws that secure the Display panel assembly and slide the Display assembly forward.

3. Disconnect the ribbon cable from the blue connector (right of Operator panel board). Peel the control panel (P/N M3103) from the front of the door and install a replacement. Make sure to realign the Control panel properly.

   If one or more control panel keys are still inoperative, follow steps 2 and 3 in Section 4.5.4 (One or More Parts of the Display Panel are Inoperative).

4. Reassemble the unit.

4.5.6 Digi Loses or Gains Time and/or Loses Program Information

Equipment Required:

- Phillips screwdriver
- Volt/ohm meter

Procedure:

1. Eliminate all external power to the system.

2. Remove the four screws that secure the Display panel assembly and slide it forward to access the 4 Plus DA board.

3. Attach the positive lead of the voltmeter to the positive end of the +3.6 V battery (left rear of board) and the negative lead to the negative end of the battery. The reading should be between +3.5 V and 4.5 V.

   If the reading is within range, replace the 4 Plus DA board. (See Section 2.3.1 for the procedure.)

   If the reading is not within range and the Digi has not been used for a period of time, plug in the Digi for 24 hours to recharge the battery.

   - If the reading is still not within range after recharging, replace the battery*.

     - If the reading is still not within range after replacing the battery, replace the 4 Plus DA board. (See Section 2.3.1 for the procedure.)

4. Reassemble the unit.

---

* To replace the battery:
  - Eliminate all external power to the system.
  - Remove the 4 Plus DA board. (See Section 2.2.1 for the procedure.)
  - Place the board face down on a non-conductive surface to remove the battery.
  - Solder the replacement battery from the bottom of the board.

4.5.7 All System Input Values are Over Range or Open

Equipment Required:

- Phillips screwdriver
- 4-5 K ohm ¼ W resistor

Procedure:

1. Access Configuration Code 001. Make sure you assigned data from each Scanner to a different row of channels. For example, if you have three Scanners, assign a 1 to digit 1, a 2 to digit 2 and a 3 to digit 3. (See Section 11.1 of the User's Manual for more information.

2. Eliminate all external power to the system. Access the 4 Plus Scanner boards. (See Section 2.3.7 for the procedure.) Check the bank select jumpers on each 4 Plus Scanner board (right corner of board) to make sure each jumper setting is different. For example, bank 1, jumper on #1; bank 2, jumper on #2; bank 3, jumper on #3.

3. Disconnect the ribbon cable from J26 (right of board) on all Analog and RTD Scanner boards.

5. Place a 4-5 K ohm ¼ W resistor across the GND and the FLT IN test points of the 4 Plus Analog board (accessible from the front of the Display panel).

6. Restore power to the system. Assign Function Code 001 (65 mV DVM measuring range) to Channel 101.

   If the reading at Channel 101 is still over range or open, replace the 4 Plus Analog board. (See Section 2.2.4 for the procedure.)

   - If the reading is still over range or open after you replace the 4 Plus Analog board, contact Kaye.

7. Reprogram Channel 101. Reassemble the unit.

4.5.8 Some System Input Values are Over Range or Open

Equipment Required:

- Phillips screwdriver
- Regular screwdriver

Procedure:

1. Check sensors. A faulty thermocouple or voltage input generates an open reading. A faulty RTD generates an over range reading. (Eliminate all external power to the system when you are in contact with the input terminals.)

   If a sensor is generating an over range or open reading, move it to a channel address displaying an accurate reading.

   If the sensor generates an over range or open reading at the second channel, the sensor is faulty. Replace it.

   If the sensor generates an accurate reading at the second channel, go to step 2.

2. Check program. If required parameters are undefined, an over range condition results. The function code determines which parameters must be defined.

   Generate a list program* of over range or open channels. Check the function codes and verify that all required parameters are defined. If the program is complete and accurate, go to step 4.

4. Eliminate all external power to the system. Connect jumper wires across the + and - input terminals of all channels that are over range or open.

5. Restore power to the system. Assign Function Code 001 (65 mV DVM measuring range) to all channels that are over range or open. Access each channel.

   If the readings are not 00.000 mV (±.008 mV), replace that 4 Plus Scanner board. (See Section 2.3.7 for the procedure.)

   If you replace the 4 Plus Scanner board(s) and the readings are still over range, open or not within spec, contact Kaye.

6. Reassemble the unit.

---

* To generate a listing of all channels:
  - Press the CHANNEL key.
  - Press the LIST PROGRAM key.
  - Press the ENTER key.

See Section 3.3 of the User's Manual for more information.

4.5.9 System Input Values Drift

Equipment Required:

- Phillips screwdriver
- Regular screwdriver
- 4-5 K ohm ¼ W resistor
- Volt/ohm meter

Procedure:

1. Make sure the power cord is connected.

   If the inputs are RTD's:

   Place equivalent value resistors across the + and - input terminals of all channels that drift. Replace any faulty RTD's.

   If the readings still drift, check and, if necessary, calibrate the 4 Plus Analog board. (See Section 1.3 for the procedure.)

   - If you can calibrate the 4 Plus Analog board properly, replace the 4 Plus RTD Panel Assembly. (See Section 2.3.11 for the procedure.)

   - If you cannot calibrate the 4 Plus Analog board properly, replace it. (See Section 2.3.2 for the procedure.)

   If the inputs are thermocouples:

   Connect jumper wires across the + and - input terminals of all channels that drift.

   If the readings are room temperature, replace any faulty thermocouples.

   If the readings are not room temperature, access the UTR board (See Section 2.3.8 for the procedure). Check the two RTD leads that terminate on the board with the volt/ohm meter.

   - If the reading is between 100-120 ohms, replace the 4 Plus Scanner board. (See Section 2.3.7 for the procedure.)

   - If the reading is not between 100-120 ohms, replace the UTR board. (See Section 2.3.8 for the procedure.)

   If the inputs are voltages:

   Attach a verified voltage source to all channels that drift.

   - If channels still drift, go to the next page.

   - If channels do not drift, check input sensors. Replace any faulty sensors.

Assign Function Code 001 (65 mV DVM measuring range) to Channel 101.

Eliminate all external power to the system. Disconnect the ribbon cable from J26 on all 4 Plus Scanner boards. Place a 4-5 K ohm ¼ W resistor across the GND and the FLT IN test points of 4 Plus Analog board accessible from the front of the Display panel assembly.

Restore power to the system and access Channel 101.

If the reading is not 00.000 mV (±.008 mV), calibrate the 4 Plus Analog board.

- If you cannot calibrate the 4 Plus Analog board, replace it. (See Section 2.3.2 for the procedure.)

- If you can calibrate it but the reading is still not 00.000 mV (±.008 mV), contact Kaye.

If the reading is 00.000 mV (±.008 mV) but drifts by more than 8 counts, replace the 4 Plus Analog board. (See Section 2.3.2 for the procedure.)

- If the data values still drift after you replace the 4 Plus Analog board, contact Kaye.

If the reading is 00.000 (±.008 mV) mV and does not drift, replace the 4 Plus Scanner board. (See Section 2.2.7 for the procedure.)

Reprogram Channel 101.

2. Reassemble the unit.

4.5.10 System Input Values are Incorrect

Equipment Required:

- Phillips screwdriver
- Regular screwdriver
- Volt/ohm meter

Procedure:

1. Generate a list program* of all channels. Make sure all programmed instructions are complete and accurate.

2. If the inputs are all RTD's:

   If the readings are still incorrect, check and, if necessary, calibrate the 4 Plus Analog board. (See Section 1.3 for the procedure.)

   - If you cannot calibrate the 4 Plus Analog board properly, replace it. (See Section 2.3.2 for the procedure.)

   - If you can calibrate the 4 Plus Analog board properly but the system input values are still incorrect, contact Kaye.

   If the inputs are all thermocouples:

   Make sure the red lead is connected to the - input terminal of all channels that are incorrect.

   If the readings are still incorrect, check the thermocouples by substituting shorts across the + and - input terminals.

   - If the readings are room temperature, replace any faulty thermocouples.

   - If the readings are not room temperature, check and, if necessary, calibrate the 4 Plus Analog board. (See Section 1.3 for the procedure).

     - If you cannot adjust it properly, replace the 4 Plus Analog board. (See Section 2.3.1 for the procedure.)

---

* To generate a listing of all channels:
  - Press the CHANNEL key.
  - Press the LIST PROGRAM key.
  - Press the ENTER key.

See Section 3.3 of the User's Manual for more information.

- If you can adjust it properly, access the UTR board. (See Section 2.3.8 for the procedure.) Check the two RTD leads that terminate on the board with the volt/ohm meter.

  - If the reading is between 100-120 ohms, replace the 4 Plus Scanner board. (See Section 2.3.7 for the procedure.)

  - If the reading is not between 100-120 ohms, replace the UTR board. (See Section 2.3.8 for the procedure.)

If the inputs are voltages:

If the readings are still incorrect, attach a verified voltage source to the + and - input terminals of Channel 101 on the 4 Plus Scanner board.

Assign the Function Codes 001, 002 and 003 to Channel 101. Use the table below to determine the proper readings.

Function Code	Measuring Range	Verified Voltage Input	Reading
001	65 mV	30 mV	30.000 (±.008)
002	650 mV	300 mV	300.00 (±.08)
003	6.5 V	3 V	3.0000 (±.0004)

If one of the readings is not within range, calibrate the 4 Plus Analog board. (See Section 1.3 for the procedure.)

- If you cannot calibrate it, replace the 4 Plus Analog board. (See Section 2.3.2 for the procedure.)

- If you can calibrate it but one of the readings is still not within range, contact Kaye.

If all of the readings are within range, repeat the procedure on another 4 Plus Scanner board. If the readings are still within range, contact Kaye.

4.5.11 Even and/or Odd Master Relays Do Not Operate Properly

CAUTION:
This procedure involves setting and resetting the master relays. Be aware that you will turn your master relay activated devices on and off during this procedure.

Equipment Required:

- None

Procedure:

1. Access Configuration Code Address 007 to see how you configured the system to turn the master relays on.

   As a default, digit 1 = 0 (odd master relay is turned on when any odd relay address is turned on) and digit 2 = 0 (even master relay is turned on when any even relay address is turned on).

   Use the following information to determine the values of digits 1, 2 and 3. (See Section 7.2.2 of the User's Manual for more information.)

Digit 1 ODD Master Relay

Value	Relay Condition
0	Static operation while MRELAY at limit with odd relay address
1	Pulse when MTRIP at limit with odd relay address
2	Pulse when MRETURN at limit with odd relay address
3	Pulse when MTRIP or MRETURN at limit with odd relay address
4	Static operation while MRELAY at limit with non-zero relay address
5	Pulse when MTRIP at at limit with non-zero relay address
6	Pulse when MRETURN at limit with non-zero relay address
7	Pulse when MTRIP and MRETURN at limit with non-zero relay address

Digit 2 EVEN Master Relay

Value	Relay Condition
0	Static operation while MRELAY at limit with even relay address
1	Pulse when MTRIP at limit with even relay address
2	Pulse when MRETURN at limit with even relay address
3	Pulse when MTRIP or MRETURN at limit with even relay address
4	Static operation while MRELAY at limit with non-zero relay address
5	Pulse when MTRIP at at limit with non-zero relay address
6	Pulse when MRETURN at limit with non-zero relay address
7	Pulse when MTRIP and MRETURN at limit with non-zero relay address

Digit 3 Master Relays Normally Energized

Value	Relay Condition
0	Master relays normally de-energized
1	Master relays normally energized

2. If the master relay(s) are not operating after you check Configuration Code Address 007, program a channel (we selected 401) to activate the odd master relay. Enter the following:

Channel	Function	Limit 1 Op-Codes
401	101	1 000000 2 100000 3 170000*

* Digits 1 and 2 can be any relay 01 to 48; relay 17 arbitrarily selected.

Check to see if relay 17 and the odd master relays are activated:

Key in CHANNEL 0 1 7. The display should show .017. (Dot indicates logic bit for relay 17 is on.)

Key in CHANNEL 0 4 9. The display should show .049. (Dot indicates odd master relay logic bit is on.)

Change Limit Op-Code 3 in the table to 180000 (Relay 18) and enter the information a second time to activate the even master relay.

Key in CHANNEL 0 1 8. The display should show .018. (Dot indicates logic bit for relay 18 is on.)

Key in CHANNEL 0 5 0. The display should show .050. (Dot indicates even master relay is on.)

If the master relay logic bits turn on with this procedure, program errors caused the problem. Generate a list program of all channels. Check the Limit Op-Codes to make sure that you specified a relay address for digits 1 and 2 of Limit Op-Code 3. These digits specify the relay that the system activates. This relay, in turn, activates the master relay. Also make sure that you specified a 1 for digit 1 of Limit Op-Code 2. This digit signals the system to activate the relay you specified. (See Section 7.1 of the User's Manual for more information.)

If the master relay logic bits turn on, but the master relays are still not working, make sure the cables are properly connected and then contact Kaye.

4.5.12 24 Volt Power Supply is Inoperative

Equipment Required:

- Phillips screwdriver
- Anti-static ground strap

Procedure:

1. Eliminate all external power to the system.

2. Disconnect the power cord. Remove the four mounting screws that secure the Interface panel and slide panel forward.

3. Check the in-line fuse located between the Interface panel and the 24 volt power supply. Twist the fuse cover and pull. If the fuse has blown, replace it with a same amp fuse. If the fuse has not blown, replace the 24 volt power supply. (See Section 2.3.13.)

SECTION 5 - PACKING AND SHIPPING

The container in which Kaye ships each Digi 4 Plus from the factory is designed to protect the unit from damage during transit. It is important that you use similar packaging whenever you ship a Digi 4 Plus. The following paragraphs outline proper packing and shipping procedures.

Before you place the Digi 4 Plus in a shipping container, securely wrap it with paper or static free plastic. The wrapping must be secure enough to keep packing materials out of the interior of the unit.

Use containers that are made of wood or double wall corrugated paper. They should be four inches larger than the Digi 4 Plus to allow room for packing material.

Place the Digi 4 Plus in the container with corner blocks of high density foam or multi-layered corrugated paper to prevent it from shifting during transit. Fill the space around it with plastic foam "peanuts".

Secure corrugated boxes with reinforced packing tape.

To expedite handling, attach a label to the top of the Digi 4 Plus that contains your company name and address, the destination, a description of the unit and any other inclusions such as keys or manuals. If you are returning the Digi 4 Plus to Kaye for service, include the return authorization number that you obtained from Kaye's Customer Service Department.

If you anticipate frequent shipments, we recommend that you use a reshippable container (available from Kaye) that is suitable for air or motor freight transport. It has a custom formed interior that is designed to safely hold the Digi 4 Plus, power cord and user guides.

SECTION 6 - CONTACTING KAYE

The procedures in this manual describe on-site maintenance of your Digi 4 Plus. However, technical service and applications assistance are also available from our Customer Service Department.

Before you call us, please take a few minutes to be sure that you have answers to the questions listed below. This information will help us work more efficiently, and results in a shorter response time to you.

1. What is the model and serial number of your Digi 4 Plus?
2. What are the symptoms of the problem?
3. What is the general application?
4. Did the Digi 4 Plus perform properly before, either at its present location or another location?
5. Have there been recent changes to the system or the equipment with which it works?
6. Is this a new installation?
7. Do you have the documentation?
8. Can you have the system close to you when you call?
9. If you are not a technical person, is there a technical person available? What is his/her name and telephone number?

APPENDIX A - SPECIFICATIONS

This appendix includes Digi 4 Plus specifications and thermocouple and RTD range and accuracy specifications*.

DIGI 4 PLUS SPECIFICATIONS

	Digistrip 4 Plus	Digi-Link 4 Plus
Power:	90-135 VAC, 50/60 Hz (115 VAC) 200-270 VAC, 50/60 Hz (230 VAC) Idling: 42 W Printing: 76 W (average) 200 W (peak)	90-135 VAC, 50/60 Hz (115 VAC) 180-270 VAC, 50/60 Hz (230 VAC) Power: 35 W
Dimensions:	31.1 cm h X 48.3 cm w x 60.1 cm d (12.25" h x 19.0" w x 23.7" d)	91.44 cm h X 60.96 cm w x 46.99 cm d (36" h x 24" w x 18.5" d)**
Weight:	33.6 Kg (74 pounds)	66.3 Kg (146 pounds) fully populated
Fuse Rating:	1.5A Slo-Blo (115 VAC) 1.0A Slo-Blo (230 VAC)	Circuit Breaker rating: 1.0A (115 VAC) .5A (230 VAC)

Environmental:	Temperature: 0-50°C (32-125°F) Relative Humidity: 95% (non-condensing)
System Input Capacity:	Analog: Digistrip 4 Plus, up to 64 on-board; 128 with expansion chassis. Digi-Link 4 Plus, up to 128 on-board Status: Up to 32
Scanning Speed:	Analog: 40 channels/sec. at 60 Hz; 33.3 channels/sec. at 50 Hz. 1 channel of overhead per scan; 1 channel of overhead per scanner. Status Inputs: once/math scan*** Calculations: once/math scan***
Input Impedance:	>1 GΩ. Source >10 KΩ will produce false open circuit readings.
Common Mode Rejection:	140 db @ DC; 120 db, line freq. to 100 KHz (100 Ω source imbalance)
Maximum Common Mode Voltage	100V peak from channel to channel within each scanner 350V peak between scanners and from scanner to frame ground
Normal Mode Rejection:	60 db @ 50 or 60 Hz
Voltage Input Accuracy	30 days: ±(0.003% of reading + 2 count + 4 µV) 1 year: ±(0.006% of reading + 2 count + 4 µV)
Resolution:	1:60,000
Sensitivity:	0.5 µV (on most sensitive range)
Voltage Temperature Coefficient:	±(0.1 µV + 0.001% reading)/°C
Compensator Temperature Coefficient:	±0.01°C/°C
Input Terminal Temperature Nonuniformity:	±0.05°C Digi-link 4 Plus ±0.10°C Digistrip 4 Plus

* Calibration temperature 25°C ±2°.

** Dimensions are for NEMA enclosure.

*** A typical math scan ranges from .30 to 1.00 seconds.

DIGI 4 SPECIFICATIONS (continued)

Direct Input Ranges:	30.000** mV, 60.000 mV, 600.00 mV, 6.0000 V, 12.000 V
Thermocouple Types:	B, C, E, J, K, N, R, S, T: 0.1°F or 0.1°C res. T: 0.01°C res. (limited range)
RTD Types:	100 Ω Pt, 3-wire bridge or 4-wire 1 mA loop: 0.1°F, 0.1°C, or 0.01°C res. 10 Ω Cu, 3-wire bridge: 0.1°F or 0.1°C res.

** Types R, S and T only

THERMOCOUPLE AND RTD RANGE AND ACCURACY SPECIFICATIONS

Input Types	Range	NBS Conformity	System Accuracy
B(Pt30 Rh/Pt 6 Rh)	454°C to 1811°C (850°F to 3292°F)	0.1°C	±(0.003% reading+0.75°C)
C(W 5 Re/W 26 Re)	-37°C to 2293°C (-35°F to 4159°F)	0.1°C (non-NBS std)	±(0.003% reading+0.40°C)
E(Chromel-Constantan)	-109°C to 787°C (-164°F to 1448°F)	0.06°C	±(0.003% reading+0.30°C)
J(Iron-Constantan)	-112°C to 1130°C (-170°F to 2066°F)	0.06°C	±(0.003% reading+0.30°C)
K(Chromel-Alumel)	-137°C to 1392°C (-215°F to 2537°F)	0.06°C	±(0.003% reading+0.30°C)
N(Nicrosil-Nisil)	-95°C to 1295°C (-139°F to 2364°F)	0.06°C	±(0.003% reading+0.20°C)
R(Pt 13 Rh/Pt)	-21°C to 1779°C (-5°F to 3234°F)	0.1°C above 260°C 20.0°C below 260°C	±(0.003% reading+0.80°C)*
S(Pt 10 Rh/Pt)	-21°C to 1767°C (-5°F to 3212°F)	0.1°C above 260°C 20.0°C below 260°C	±(0.003% reading+0.80°C)*
T(Copper-Constantan)	-220°C to 402°C (-364°F to 755°F)	0.06°C	±(0.003% reading+0.30°C)
T(DIN 43710 Cu/CuNi)	-211°C to 599°C (-348°F to 1110°F)	0.1°C (non-NBS std)	±(0.003% reading+0.35°C)
RTD, 10 Ω Cu bridge	-198°C to 270°C (-325°F to 519°F)	0.06°C	±(0.003% reading+0.15°C)
RTD, 100 Ω Pt @ 1mA	-127°C to 441°C (-196°F to 826°F)	0.01°C**	±(0.003% reading+0.15°C)
RTD, 100 Ω Pt bridge	-128°C to 340°C (-198°F to 644°F)	0.01°C**	±(0.003% reading+0.025°C)

* Accuracy specification for temperature above 260°C
** Conformity to DIN 43760 (alpha = 0.00385 ohms/ohm/°C)

System accuracy includes all instrument errors (e.g., maximum conformity, deviations, reference junction compensation with worst case thermal scatter of input terminals, long term drift, temperature coefficients, A/D conversion errors, and scanner errors). System accuracy, 30 days 20°C to 30°C ambient.

APPENDIX B - SYSTEM DRAWINGS

The Digi 4 Plus has three kinds of system drawings:

- Printed circuit board schematics
- System wiring diagrams
- Outline drawings

The system drawings in this appendix are grouped in seven categories that describe specific operations performed within the Digi 4 Plus.

First locate the category. Read down the column to locate a specific drawing. Then read across that line for information about the drawing and its page reference.

SYSTEM OUTLINE AND WIRING DIAGRAMS

Description	Digistrip 4 Plus	Digi-Link 4 Plus	Dwg#/Rev	PCB#/Rev	# Sheets	Page #
Outline drawing	X		C1380-33/0	N/A	1	B-3
System wiring	X		D1380-74/0	N/A	1	B-4
Outline drawing		X	D1365-78/2	N/A	1	B-5
System wiring		X	D1365-88/0	N/A	1	B-6
Expander box	X		C1380-85	N/A	1	B-7

PROGRAMMING I/O

Description	Digistrip 4 Plus	Digi-Link 4 Plus	Dwg#/Rev	PCB#/Rev	# Sheets	Page #
Operator panel	X	X	8400-18/3	U0945/D	1	B-8

LOGICAL DATA I/O

Description	Digistrip 4 Plus	Digi-Link 4 Plus	Dwg#/Rev	PCB#/Rev	# Sheets	Page #
Status ext wire hook-up	X		D1380-94	N/A	1	B-9
Status ext wire hook-up		X	C1365-98/0	N/A	1	B-10
Status termination	X	X	8400-42/1	U0981/B	1	B-11
Status sense	X	X	8400-43/1	U0982/A	1	B-12
Master relay	X	X	8400-32/3	U0993/F	1	B-13

SYSTEM INPUT DATA

Description	Digistrip 4 Plus	Digi-Link 4 Plus	Dwg#/Rev	PCB#/Rev	# Sheets	Page #
Analog wire hook-up	X		C1380-93/1	N/A	1	B-14
Analog wire hook-up		X	C1365-96/0	N/A	1	B-15
4 Plus Analog board	X	X	8400-64/9	U0923/F	3	B-16
4 Plus Scanner board	X	X	8400-65/5	U0933/F	1	B-19
UTR board	X	X	8400-24/2	U0934/E	1	B-20
RTD ext hook-up	X		C1380-92/1	N/A	1	B-21
RTD ext hook-up		X	C1365-97/0	N/A	1	B-22
RTD conditioner	X	X	8400-37/1	U0996/A	1	B-23
4 Plus RTD power	X	X	8400-66/3	U0985/D	1	B-24

PROCESSING I/O

Description	Digistrip 4 Plus	Digi-Link 4 Plus	Dwg#/Rev	PCB#/Rev	# Sheets	Page #
4 Plus DA	X	X	8400-63/2	U0918/B*	7	B-25
4 Plus DA	X	X	8400-69/2	U0919/A	6	B-32
Interface	X	X	8400-40/6	U0988/D*	4	B-38
Interface	X	X	8400-41/1	U0984/A	2	B-42
Serial I/O	X	X	8400-36/1	U0936/B	1	B-44

PRINTER GROUP

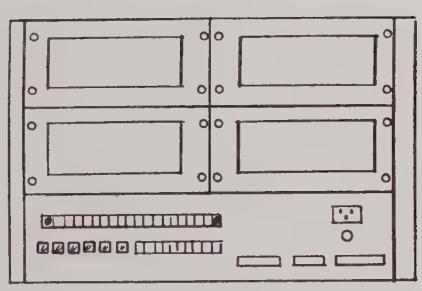
Description	Digistrip 4 Plus	Digi-Link 4 Plus	Dwg#/Rev	PCB#/Rev	# Sheets	Page #
Fence detector	X		8400-38/1	U0906/B	1	B-45
Printhead PCB	X		8400-47/2	U0986/A	1	B-46
Print Control w/Trending	X		8400-61/7	U0909/E	5	B-47

POWER

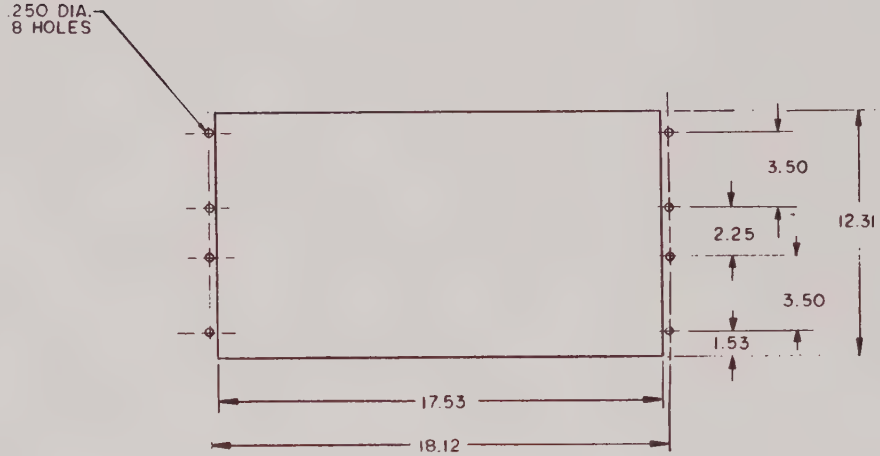
Description	Digistrip 4 Plus	Digi-Link 4 Plus	Dwg#/Rev	PCB#/Rev	# Sheets	Page #
Power dist.	X	X	8400-19/7	U0905/L*	1	B-52
Power dist.	X	X	8400-39/1	U0955/A	1	B-53

*Notice the following board replacements: U0919 will replace U0918, U0984 will replace U0988; U0955 will replace U0905.

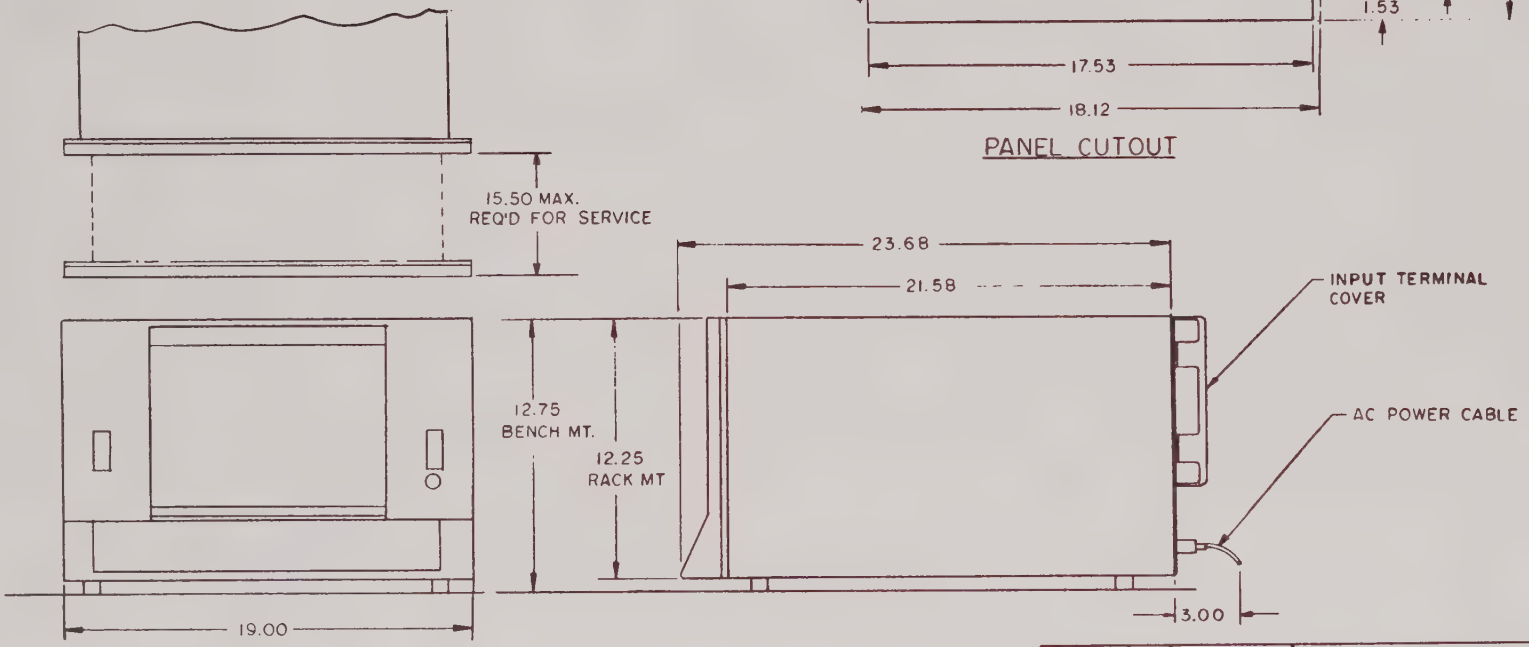
REVISIONS				
NO.	ECO	DESCRIPTION	CHKD	DATE



REAR VIEW
COVER REMOVED



PANEL CUTOUT



QTY REQ'D -3	QTY REQ'D -2	QTY REQ'D -1	PART NO.	DESCRIPTION	ITEM NO.

MATERIAL: -+-

FINISH: / /

QTY PER ASSY.

DWG SCALE 1/4

DWN BLD DATE 1-31-84

CHKD JCW DATE 1-31-84

DO NOT SCALE DRAWING

SYSTEM: DIGISTRIP 4 (C,M)

TITLE: OUTLINE DRAWING

KAYE INSTRUMENTS

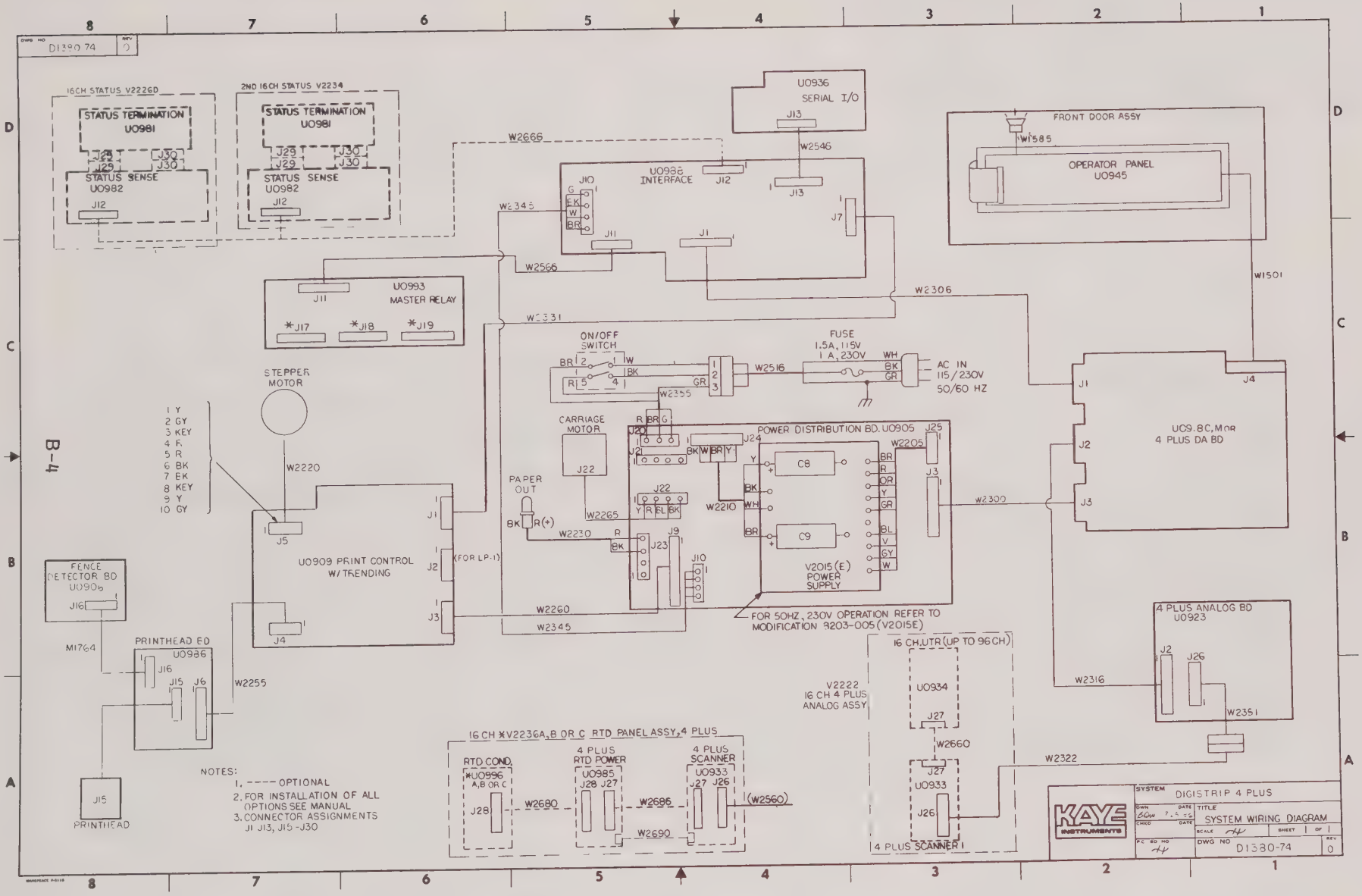
UNLESS OTHERWISE SPECIFIED: TOLER. .X ±1/32 - .XX ± .02 - .XXX ± .005 - ∠ ± 30' DEBUR ALL SHARP CORNERS. REMOVE BURRS & BREAK SHARP EDGES. ALL DIMS. IN INCHES - - MACHINE FINISH-125

DWG. NO. C1380-33

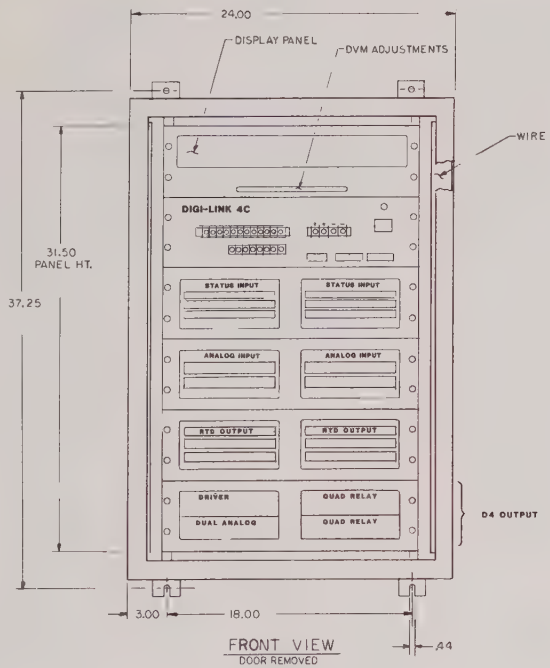
REV 0

STK NO.

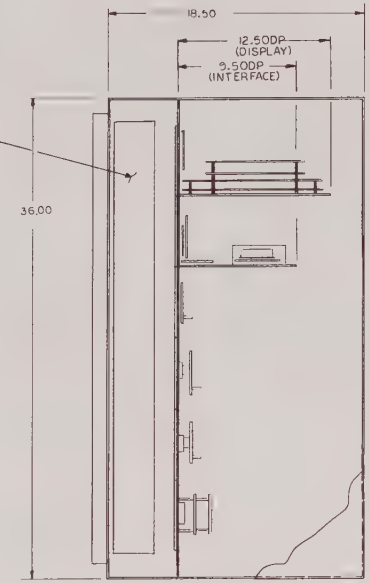
SH 1 OF 1


DWG NO D1390 74
REV 0
16CH STATUS V2226D
STATUS TERMINATION U0981
STATUS SENSE U0982
2ND 16CH STATUS V2234
STATUS TERMINATION U0981
STATUS SENSE U0982
U0936 SERIAL I/O
U0988 INTERFACE
FRONT DOOR ASSY
OPERATOR PANEL U0945
U0993 MASTER RELAY
ON/OFF SWITCH
FUSE 1.5A, 115V 1A, 230V
AC IN 115/230V 50/60 HZ
STEPPER MOTOR
CARRIAGE MOTOR
PAPER OUT
POWER DISTRIBUTION BD. U0905
V2015(E) POWER SUPPLY
U0909 PRINT CONTROL W/TRENDING
U0906 FENCE DETECTOR BD
PRINTHEAD ED U0986
PRINTHEAD
U0996 A,B OR C RTD COND.
4 PLUS RTD POWER U0985
4 PLUS SCANNER U0933
16 CH *V2236A,B OR C RTD PANEL ASSY, 4 PLUS
16 CH UTR (UP TO 96 CH)
V2222 16 CH 4 PLUS ANALOG ASSY
U0934
U0933
4 PLUS SCANNER I
4 PLUS ANALOG BD U0923
UC9.8C, M OR 4 PLUS DA BD
FOR 50HZ, 230V OPERATION REFER TO MODIFICATION 9203-005 (V2015E)
NOTES:
1. ---- OPTIONAL
2. FOR INSTALLATION OF ALL OPTIONS SEE MANUAL
3. CONNECTOR ASSIGNMENTS J1 J13, J15 -J30
KAYE INSTRUMENTS
SYSTEM DIGISTRIP 4 PLUS
TITLE SYSTEM WIRING DIAGRAM
DWG NO D1380-74
REV 0

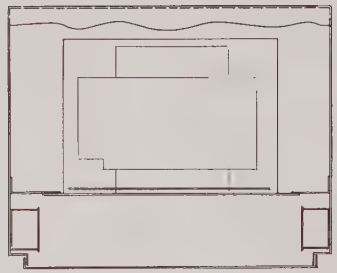
REVISIONS				
NO.	ECO	DESCRIPTION	CHKD	DATE



FRONT VIEW
DOOR REMOVED



SIDE VIEW



TOP VIEW

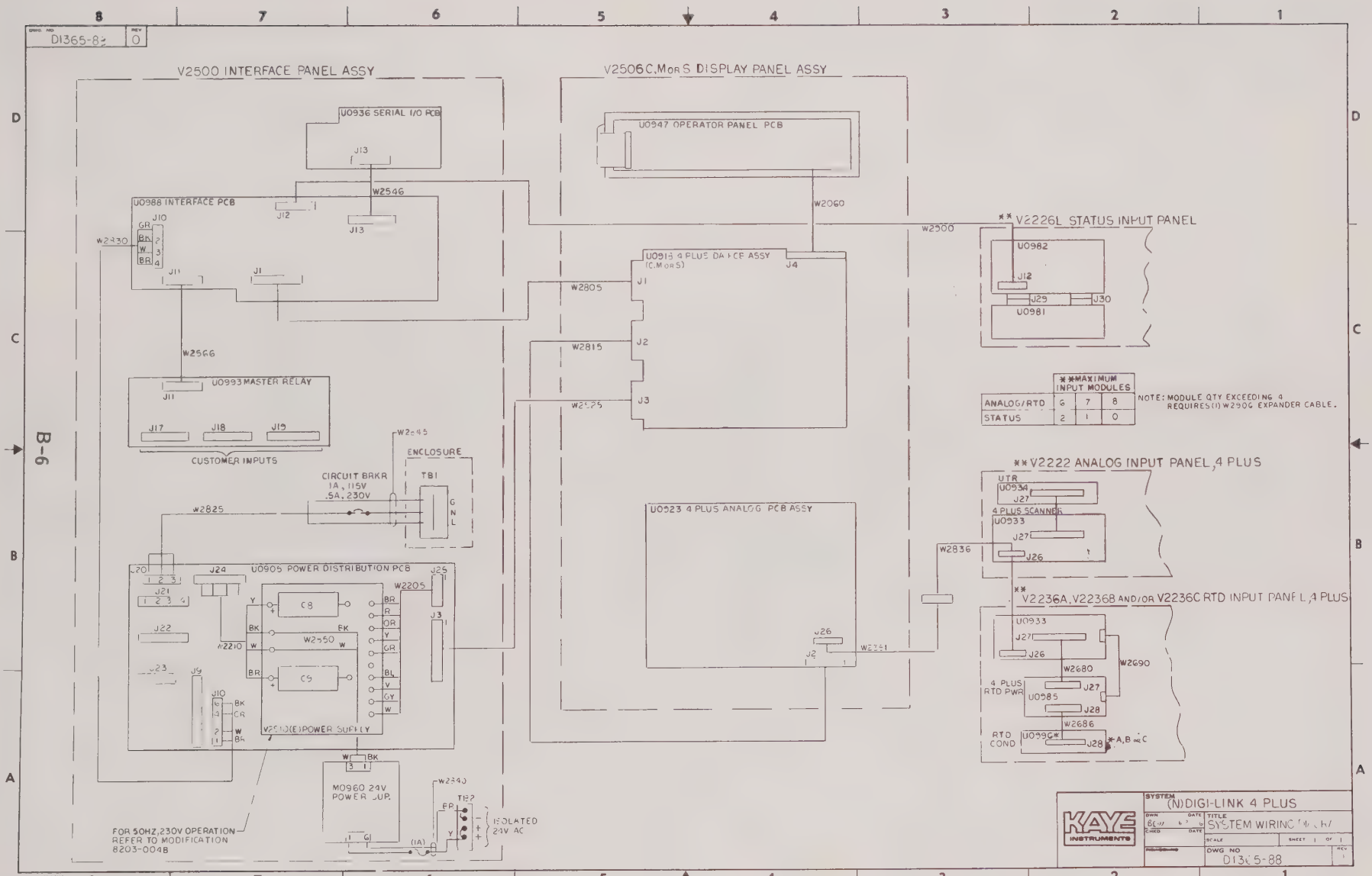
-3	-2	-1	PART NO.	DESCRIPTION	ITEM NO.
QTY REQ'D					

MATERIAL
FINISH
QTY PER ASSY
DWG. SCALE NTS
DRWN. BDW
DATE 10-4-85
CHKD.
DATE
DO NOT SCALE DRAWING
SYSTEM (N)DIGILINK 4
TITLE NEMA LAYOUT
DWG. NO. D1365-78
REV 2
STK. NO.
SH 1 OF 1

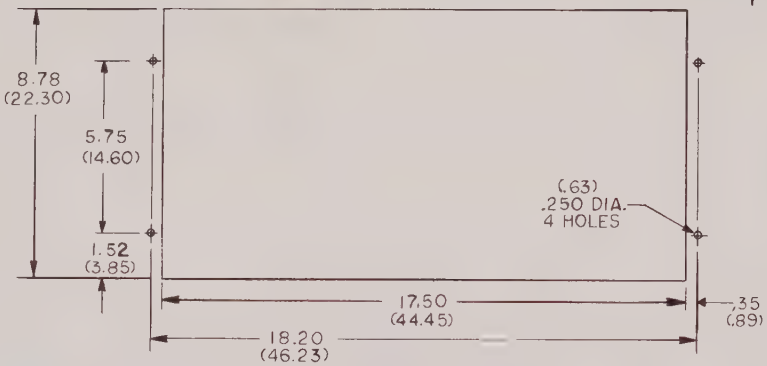
KAYE INSTRUMENTS

UNLESS OTHERWISE SPECIFIED
TOLERANCES: FRACTIONS ± .03 ANGLES ± 1°
DECIMALS .X ± .1 .XX ± .02 .XXX ± .010
REMOVE BURRS & SHARP EDGES
ALL DIMS IN INCHES - MACHINE FINISH 125

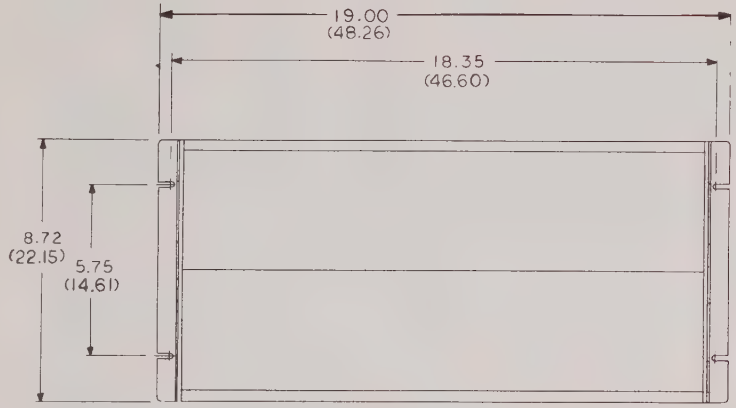
10/07/88

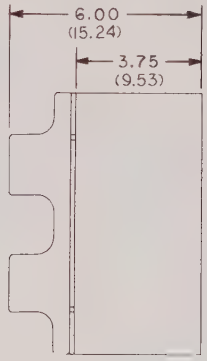

DWG. NO. D1365-88
REV 0
V2500 INTERFACE PANEL ASSY
V2506 C.MOR S DISPLAY PANEL ASSY
U0936 SERIAL I/O PCB
J13
W2546
U0988 INTERFACE PCB
J12
J13
J10
J11
J1
W2330
W2566
U0993 MASTER RELAY
J17
J18
J19
CUSTOMER INPUTS
W2545
ENCLOSURE
CIRCUIT BRKR
1A, 115V
.5A, 230V
TB1
G
N
L
W2825
U0905 POWER DISTRIBUTION PCB
J20
J24
J25
J21
J22
J23
J9
J10
W2205
W2210
W2350
C8
C9
V2510(E) POWER SUPPLY
M0960 24V
POWER SUP.
W2340
TB2
EP
(1A)
ISOLATED
24V AC
FOR 50HZ, 230V OPERATION
REFER TO MODIFICATION
8203-0048
U0947 OPERATOR PANEL PCB
W2060
U0918 4 PLUS DA PCB ASSY
(C.MOR S)
J4
J1
J2
J3
W2805
W2815
W2825
U0923 4 PLUS ANALOG PCB ASSY
J26
J2
W2331
** V2226L STATUS INPUT PANEL
W2300
U0982
J12
J29
J30
U0981
** MAXIMUM INPUT MODULES
ANALOG/RTD 6 7 8
STATUS 2 1 0
NOTE: MODULE QTY EXCEEDING 4 REQUIRES (1) W2906 EXPANDER CABLE.
** V2222 ANALOG INPUT PANEL, 4 PLUS
UTR
U0934
J27
4 PLUS SCANNER
U0933
J27
J26
W2836
** V2236A, V2236B AND/OR V2236C RTD INPUT PANEL, 4 PLUS
U0933
J27
J26
W2690
4 PLUS
RTD PWR
U0985
J27
J28
W2686
RTD
COND
U0996*
J28
*A, B or C
KAYE INSTRUMENTS
SYSTEM
(N) DIGI-LINK 4 PLUS
DWN
CHKD
DATE
TITLE
SYSTEM WIRING DIAGRAM
SCALE
SHEET 1 OF 1
DWG NO
D1365-88
REV
B-6

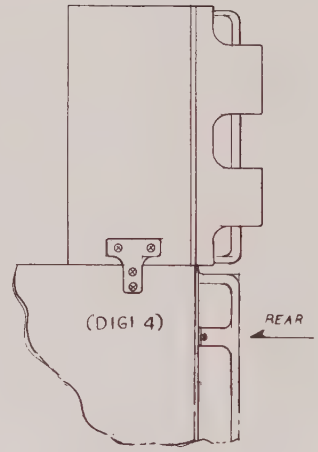
REVISIONS				
NO.	ECO	DESCRIPTION	CHKD	DATE
2	ECN 349	DWG. NO. WAS 1365-	BQW	10-2-87



PANEL CUTOUT



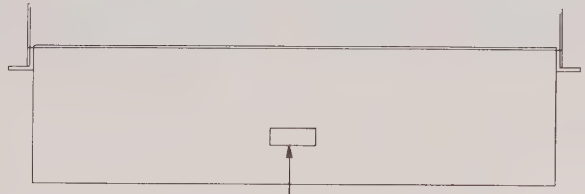




SHOWN MTD. ON D4

NOTES:

1. DIMENSIONS IN ( ) ARE CENTIMETERS.
2. RECOMMENDED MTG. FOR THE EXPANDER BOX IS DIRECTLY OVER THE DIGI 4 TO FACILITATE EXPANDER CABLE CONNECTION.



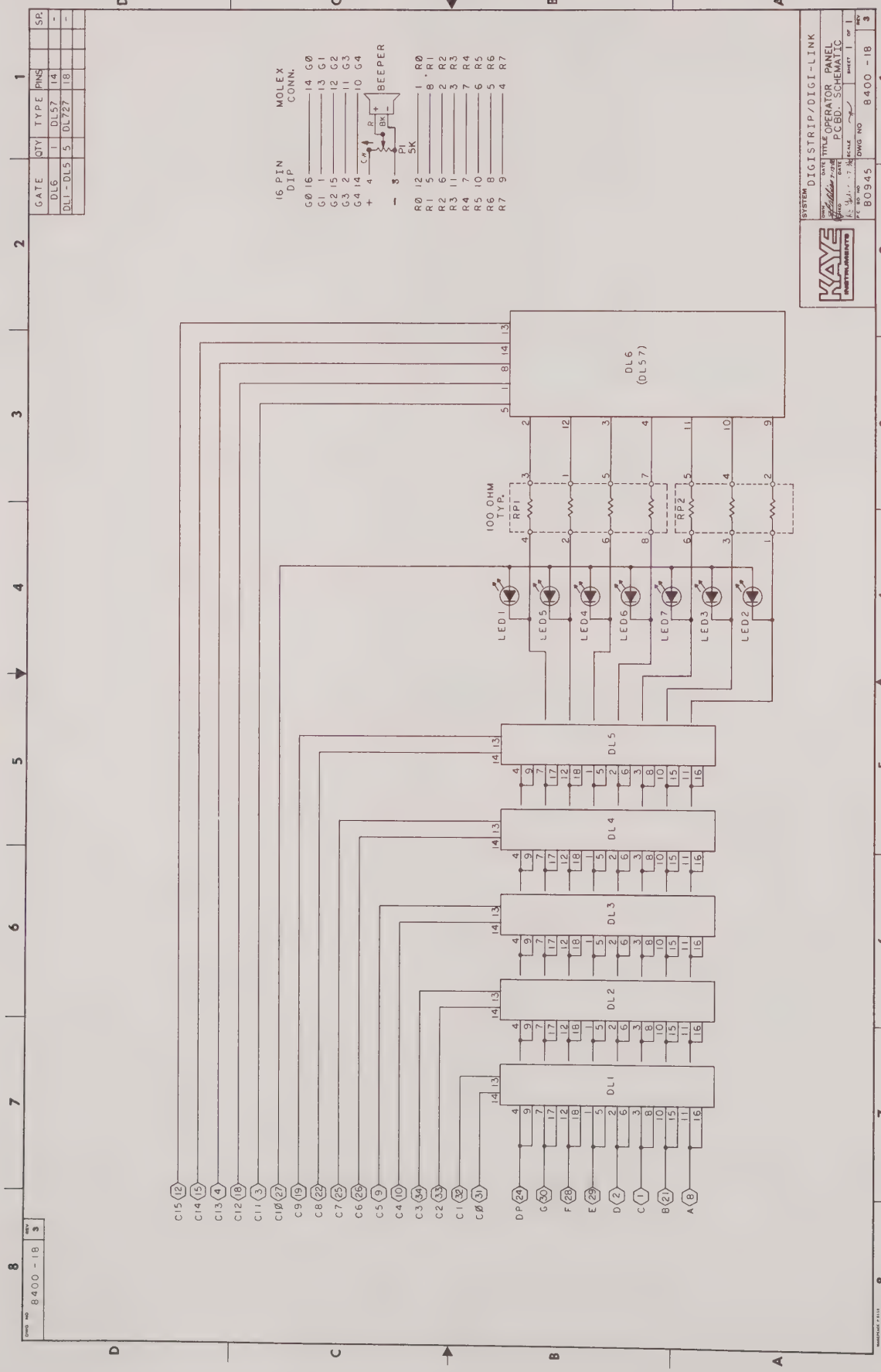
BOTTOM CABLE ENTRY PORT FOR SCANNER EXPANDER CABLE FROM DIGI 4

B-7

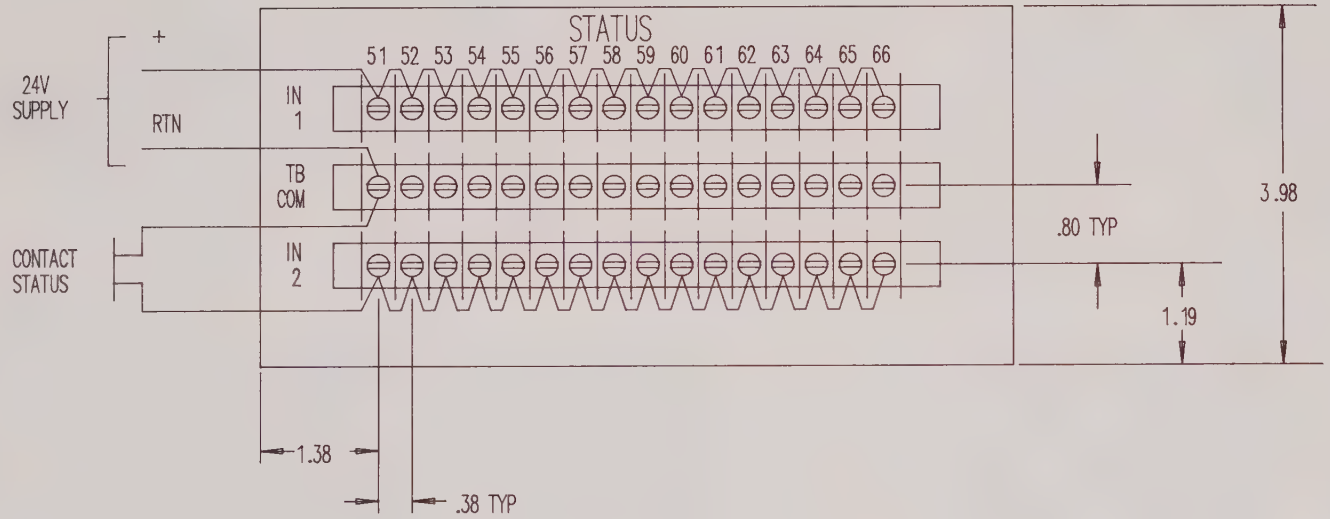
10/07/88

-3 / -2 / -1 QTY REQ'D	PART NO.	DESCRIPTION	ITEM NO.
MATERIAL: --	DWN. T.B. DATE 9-22-83	SYSTEM: DIGI 4	
FINISH: --	CHKD. BQW DATE 10-18-83	TITLE: EXPANDER BOX OUTLINE DRAWING	
QTY PER ASSY --	DWG. SCALE 1/3	DO NOT SCALE DRAWING	
KAYE INSTRUMENTS	UNLESS OTHERWISE SPECIFIED: TOLER. ±1/32 - XX± .02 - .XXX± .005 - 4° ± 30' .060 R ALL SHARP CORNERS. REMOVE BURRS & BREAK SHARP EDGES. ALL DIM. IN INCHES - - MACHINE FINISH-125	DWG. NO. C1380-85	REV 2
		STK NO.	SH 1 OF 1

REV 05/02/89


SYSTEM DIGISTRIP/DIGI-LINK
TITLE OPERATOR PANEL PCBD SCHEMATIC
DWG NO 8400-18
80945
KAY INSTRUMENTS
GATE QTY TYPE PINS SP.
DL6 1 DL57 14 -
DL1-DL5 5 DL727 18 -
16 PIN DIP
MOLEX CONN.
BEEPER
P1 5K
100 OHM TYP.
RP1
RP2
DL6 (DL57)
DL5
DL4
DL3
DL2
DL1
LED1
LED5
LED4
LED6
LED7
LED3
LED2
C15 C14 C13 C12 C11 C10 C9 C8 C7 C6 C5 C4 C3 C2 C1 C0
DP G F E D C B A

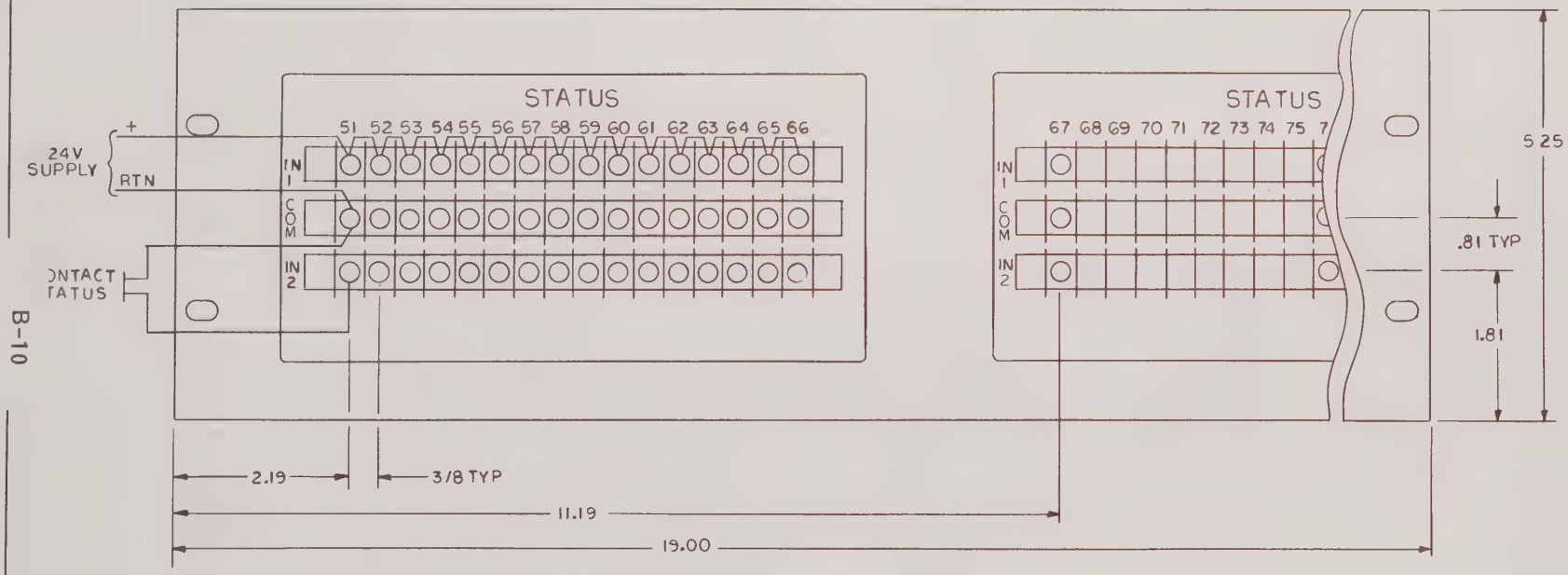
REVISIONS				
NO.	ECO	DESCRIPTION	CHKD	DATE



DWN BDW DATE 9/17/87	SYSTEM: DIGISTRIP 4
CHKD DATE	TITLE: STATUS EXTERNAL WIRING HOOKUP
DO NOT SCALE DWG.	DWG. NO. C1380-94 REV 0
KAYE	SH OF

10/07/88

REVISIONS				
NO.	ECO	DESCRIPTION	CHKD	DATE



B-10

-3	-2	-1	PART NO.	DESCRIPTION	ITEM NO.
QTY. REQ'D					

MATERIAL:

FINISH:

QTY. PER ASSY.

DWG. SCALE

DWN. BOW DATE 2-19-86

CHKD. DATE

DO NOT SCALE DRAWING

SYSTEM: NL4

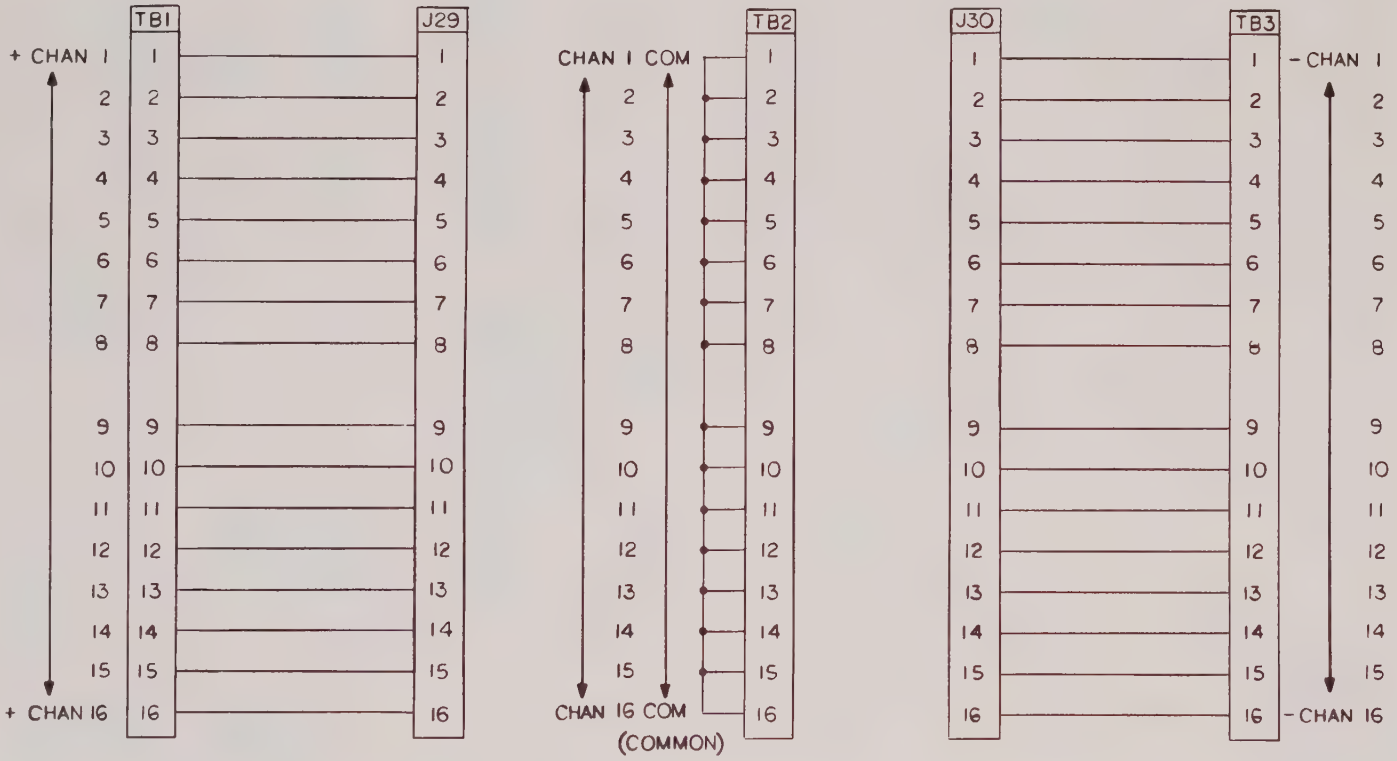
TITLE: STATUS PANEL OUTLINE DWG

KAYE INSTRUMENTS

UNLESS OTHERWISE SPECIFIED: TOLER. .5/32 - XX± .02 - XXX± .008 - ∠± 30' .090 R ALL SHARP CORNERS. REMOVE BURRS & BREAK SHARP EDGES. ALL DIM. IN INCHES - - MACHINE FINISH-125

DWG. NO. C1365-98 REV 0

STK. NO. SH 1 OF 1



SYSTEM	DIGI 4 / DIGI-LINK 4
DWN. LUCAS 1/27/84	TITLE STATUS TERMINATION P.C. BD. SCHEMATIC DWG.
CHKD. 2/11/84	SCALE NONE — SHEET 1 OF 1
P.C. BD. NO 80981	DWG. NO. 8400-42 — REV. 1

KAYE INSTRUMENTS

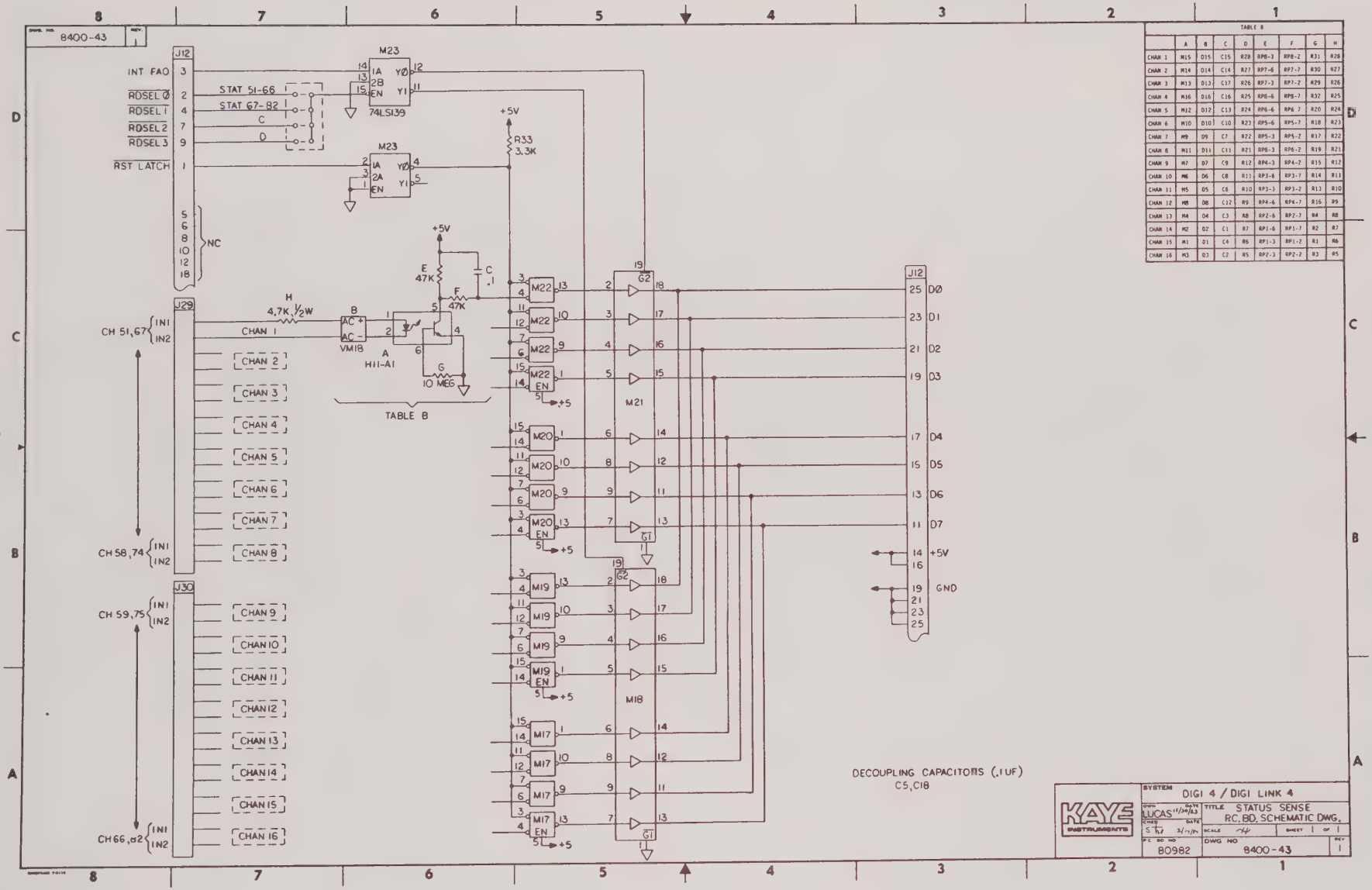
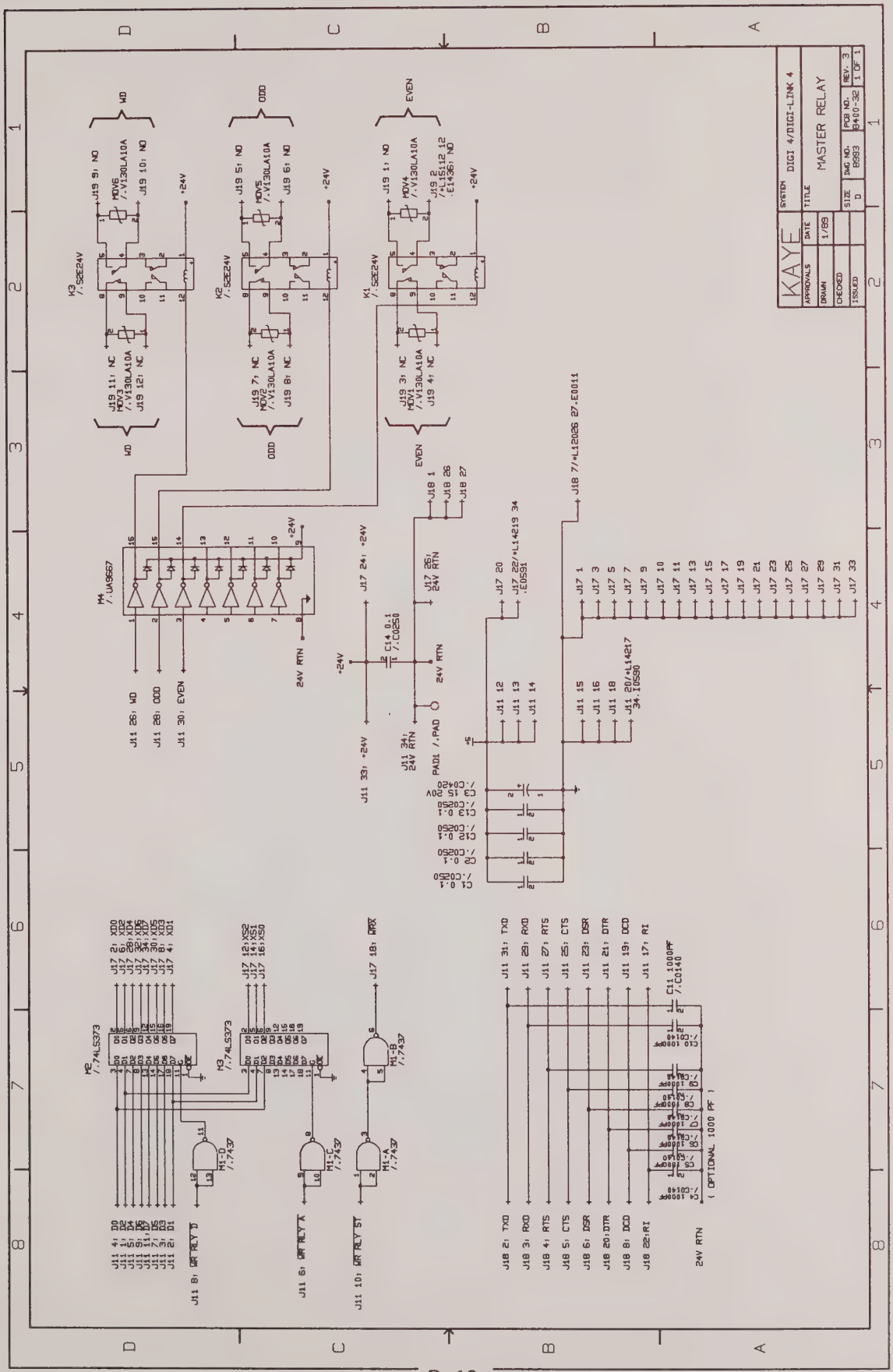
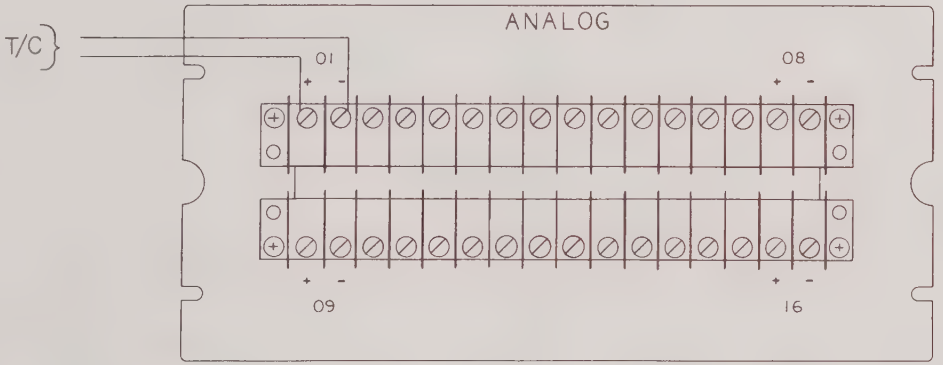


TABLE B

	A	B	C	D	E	F	G	H
CHAN 1	M15	D15	C15	R28	RP8-3	RP8-2	R31	R28
CHAN 2	M14	D14	C14	R27	RP7-6	RP7-7	R30	R27
CHAN 3	M13	D13	C17	R26	RP7-3	RP7-2	R29	R26
CHAN 4	M16	D16	C16	R25	RP8-6	RP8-7	R32	R25
CHAN 5	M12	D12	C13	R24	RP6-6	RP6-7	R20	R24
CHAN 6	M10	D10	C10	R23	RP5-6	RP5-7	R18	R23
CHAN 7	M9	D9	C7	R22	RP5-3	RP5-2	R17	R22
CHAN 8	M11	D11	C11	R21	RP6-3	RP6-2	R19	R21
CHAN 9	M7	D7	C9	R12	RP4-3	RP4-2	R15	R12
CHAN 10	M6	D6	C8	R11	RP3-6	RP3-7	R14	R11
CHAN 11	M5	D5	C6	R10	RP3-3	RP3-2	R13	R10
CHAN 12	M8	D8	C12	R9	RP4-6	RP4-7	R16	R9
CHAN 13	M4	D4	C3	R8	RP2-6	RP2-7	R4	R8
CHAN 14	M2	D2	C1	R7	RP1-6	RP1-7	R2	R7
CHAN 15	M1	D1	C4	R6	RP1-3	RP1-2	R1	R6
CHAN 16	M3	D3	C2	R5	RP2-3	RP2-2	R3	R5


KAYE
SYSTEM
DIGI 4/DIGI-LINK 4
TITLE
MASTER RELAY
DWG NO.
B993
PCB NO.
8400-32
REV. 3
SIZE
D
1 OF 1
WD
ODD
EVEN
K3 /.S2E24V
K2 /.S2E24V
K1 /.S2E24V
MOV6 /.V130LA10A
MOV5 /.V130LA10A
MOV4 /.V130LA10A
MOV3 /.V130LA10A
MOV2 /.V130LA10A
MOV1 /.V130LA10A
M4 /.UA9667
M2 /.74LS373
M3 /.74LS373
M1-D /.7437
M1-C /.7437
M1-B /.7437
M1-A /.7437
+24V
24V RTN
PAD1 /.PAD
C14 0.1 /.C0250
C3 15 20V /.C0420
C13 0.1 /.C0250
C12 0.1 /.C0250
C2 0.1 /.C0250
C11 1000PF /.C0140
(OPTIONAL 1000 PF)
J11 8; DR RLY D
J11 6; DR RLY A
J11 10; DR RLY ST
J18 2; TXD
J18 3; RXD
J18 4; RTS
J18 5; CTS
J18 6; DSR
J18 20; DTR
J18 8; DCD
J18 22; RI
J18 7/.L12026 27.E0011
J11 20/.L14217 34.10590
J17 22/.L14219 34 .E0531

REVISIONS				
NO.	ECO	DESCRIPTION	CHKD	DATE
1	ECN347	DWG NO. WAS 1365-62	BDW	10-2-89



B-14

10/07/88

-3	-2	-1	PART NO.	DESCRIPTION	ITEM NO.
QTY. REQ'D					

MATERIAL:

FINISH:

QTY PER ASSY.

DWG SCALE

DWN. P.B. DATE 3-19-84

CHKD BDW DATE 3-21-84

DO NOT SCALE DRAWING

SYSTEM: DIGI-4

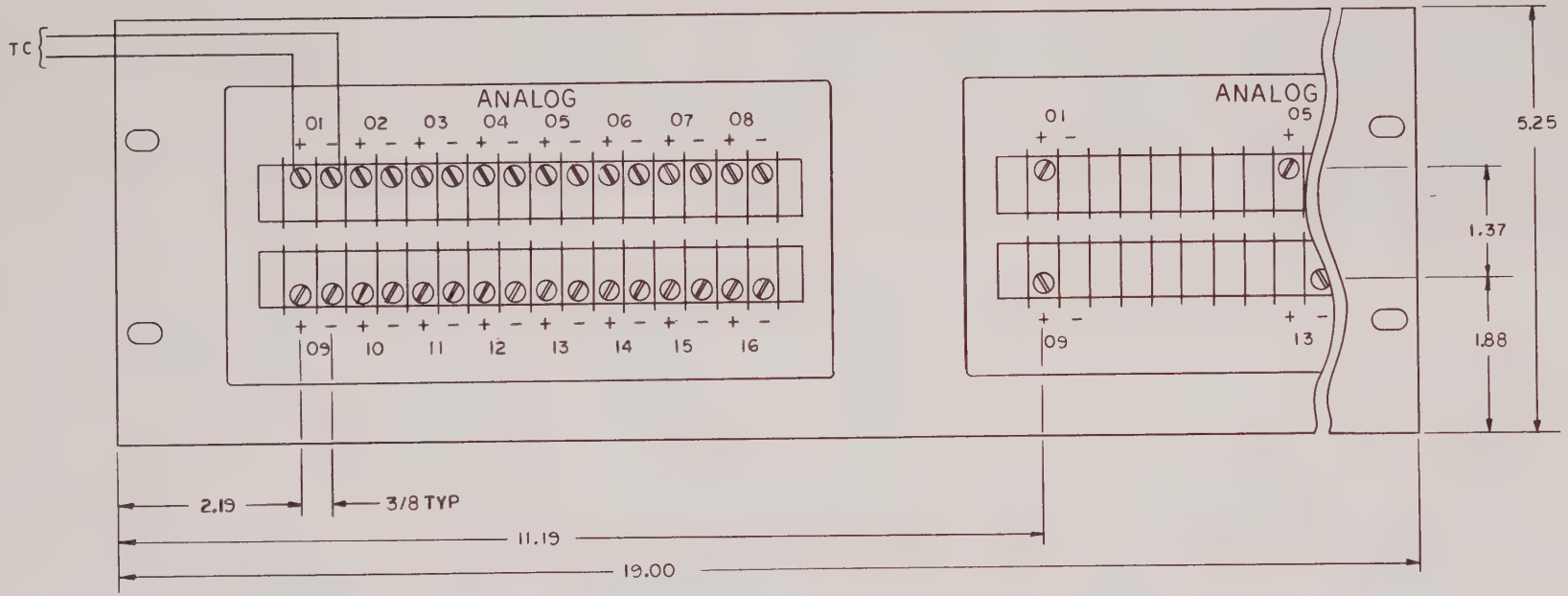
TITLE: ANALOG WIRING HOOKUP

DWG. NO. C[illegible]0-93 REV 1

KAYE INSTRUMENTS

UNLESS OTHERWISE SPECIFIED
TOLER. ±1/32 - XX± 02 - .XXX± .005 - 4.± 30'
060R ALL SHARP CORNERS
REMOVE BURRS & BREAK SHARP EDGES.
ALL DIM. IN INCHES - - MACHINE FINISH=125

REVISIONS				
NO.	ECO	DESCRIPTION	CHKD	DATE



-3	-2	-1	PART NO.	DESCRIPTION	ITEM NO.
QTY. REQ'D					

MATERIAL:

FINISH:

QTY PER ASSY. ___ DWG. SCALE ___

DWN. BOW DATE 2-18-86

CHKD. DATE

DO NOT SCALE DRAWING

KAYE INSTRUMENTS

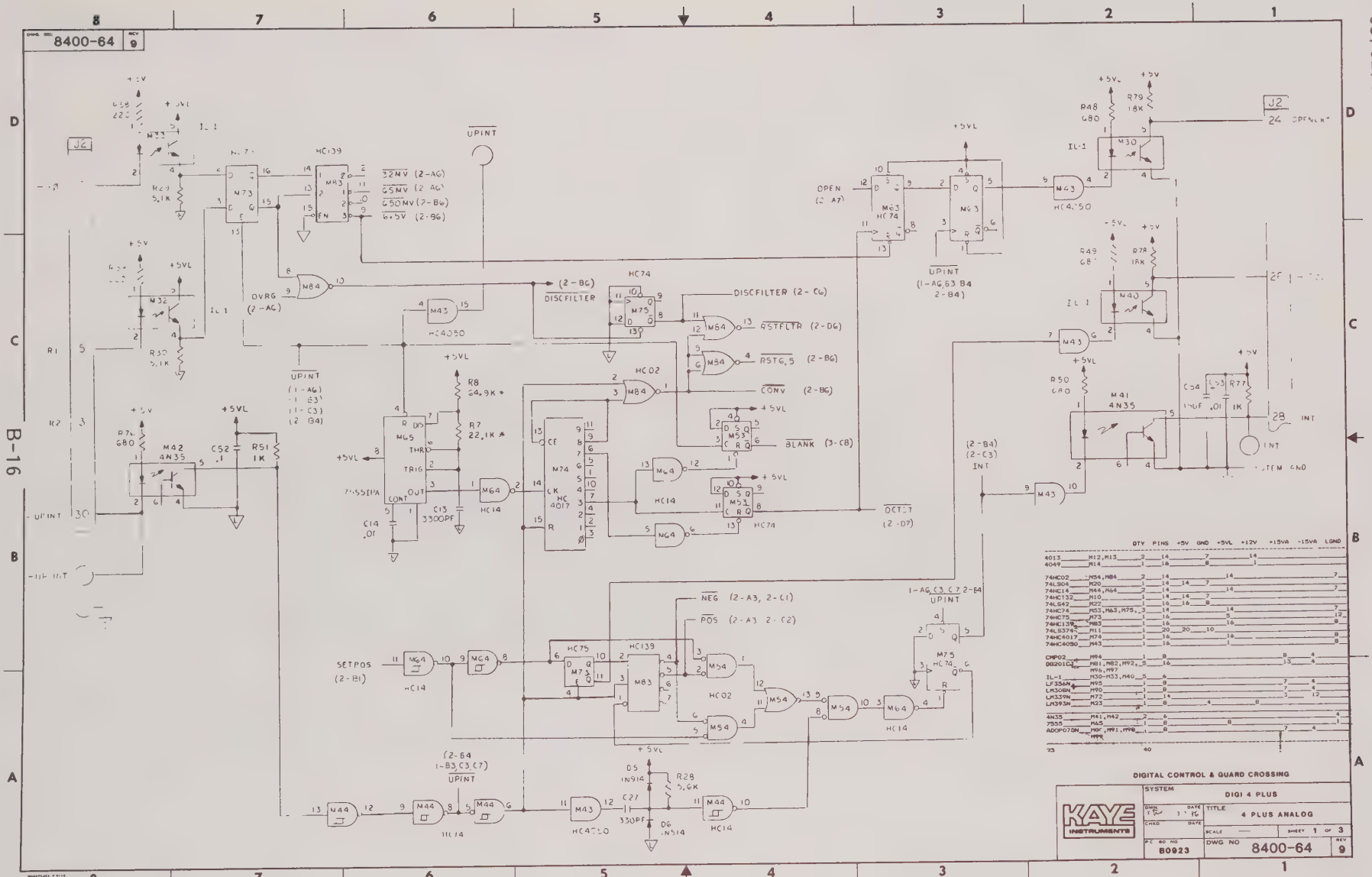
UNLESS OTHERWISE SPECIFIED: TOLER. ±1/32 · XX± .02 · XXX± .005 · 4.± 30' .060 R ALL SHARP CORNERS REMOVE BURRS & BREAK SHARP EDGES. ALL DIM. IN INCHES · · MACHINE FINISH 125

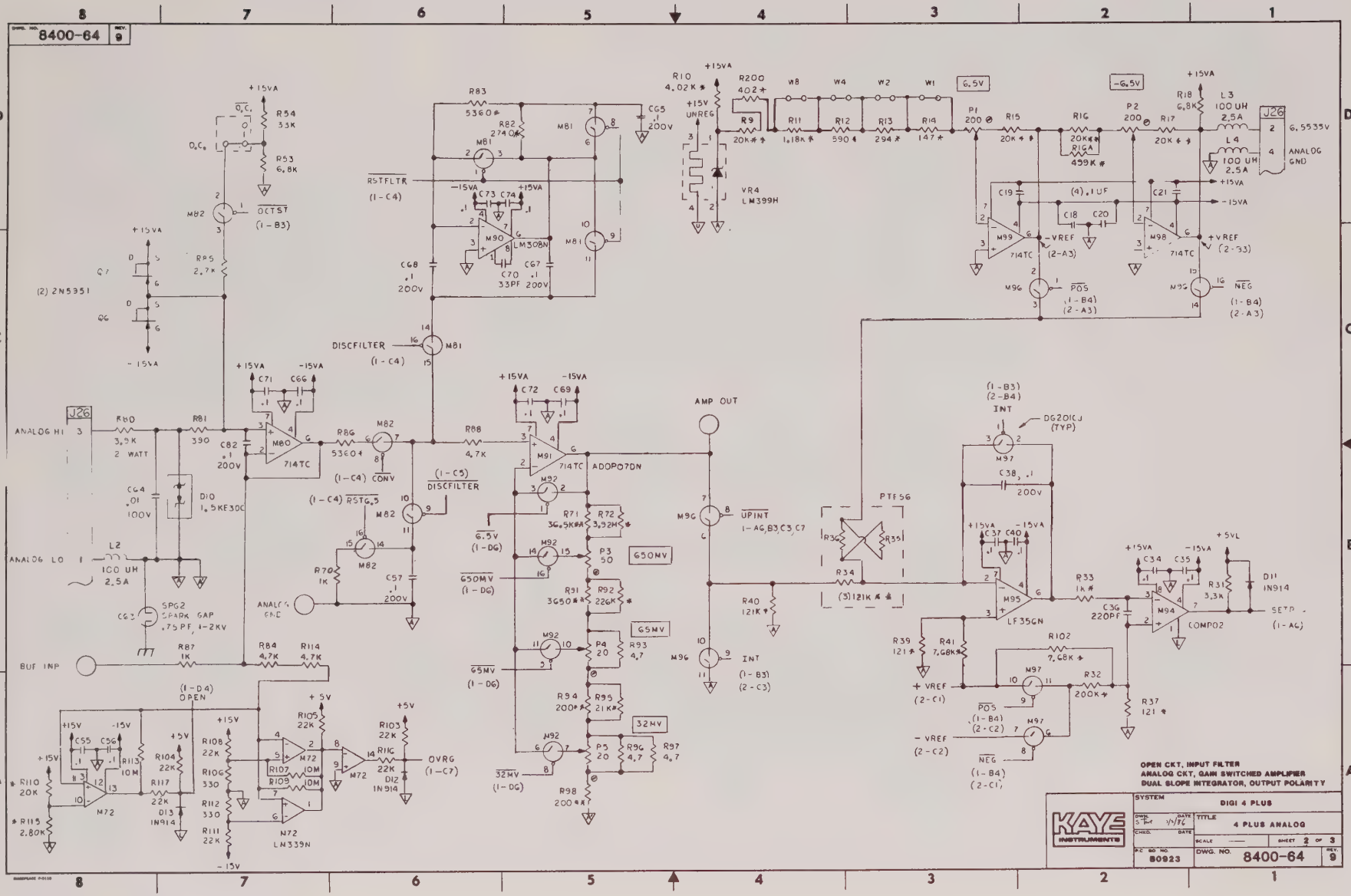
SYSTEM: NL4

TITLE: ANALOG PANEL OUTLINE DWG

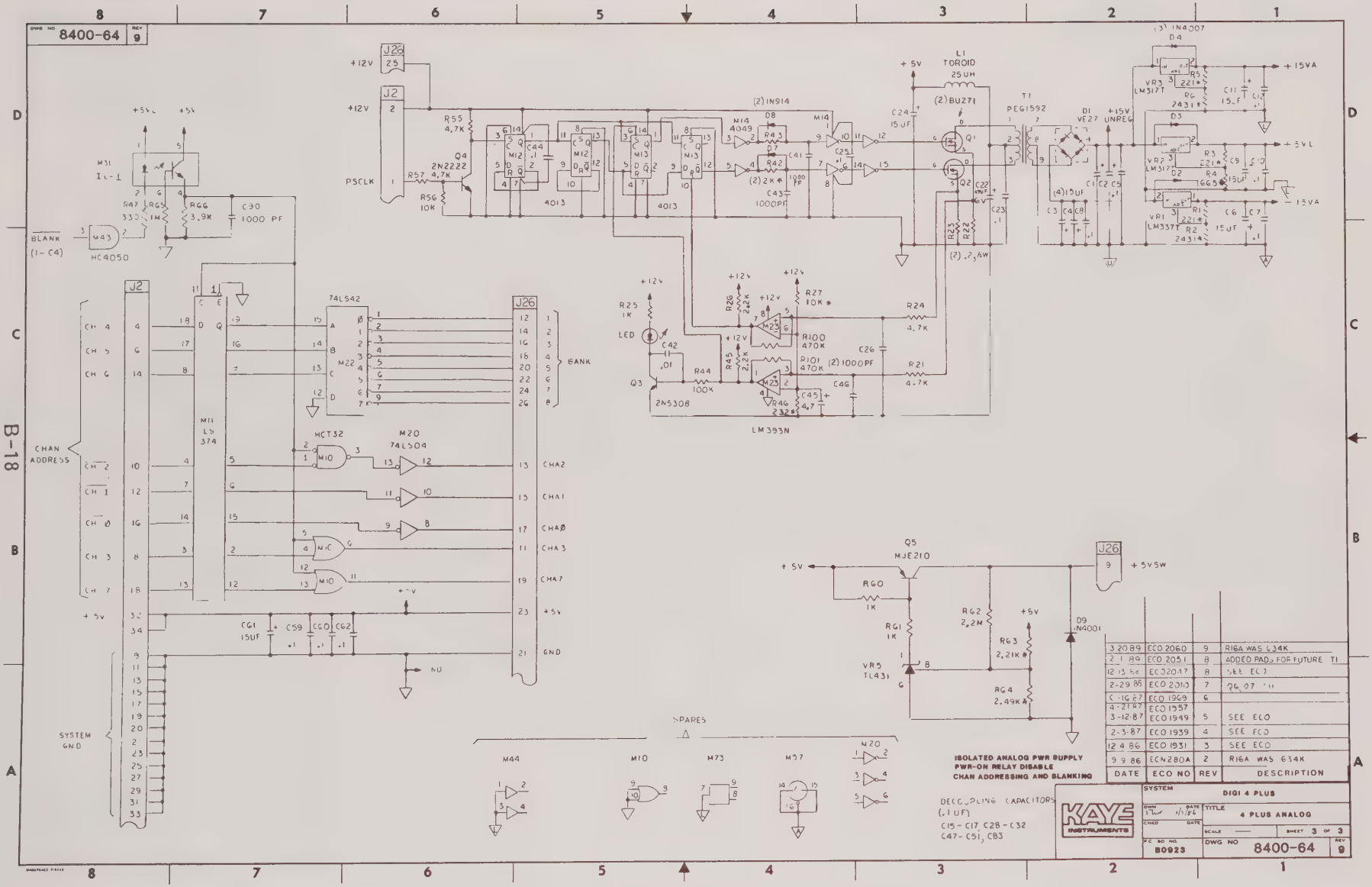
DWG. NO. C1365-96 REV 0

STK. NO. ___ SH 1 OF 1


8400-64
REV 05/02/89
B-16
UPINT
(2-BG)
DISCFILTER
DISCFILTER (2-C6)
RSTFLTR (2-DG)
RSTG.5 (2-BG)
CONV (2-BG)
BLANK (3-C8)
OCT2T (2-D7)
OVRG (2-AG)
NEG (2-A3, 2-C1)
POS (2-A3 2-C2)
SETPOS (2-B1)
OPEN (2-A7)
INT
DIGITAL CONTROL & GUARD CROSSING
KAYE INSTRUMENTS
DIGI 4 PLUS
4 PLUS ANALOG
B0923
8400-64
REV 9
SHEET 1 OF 3

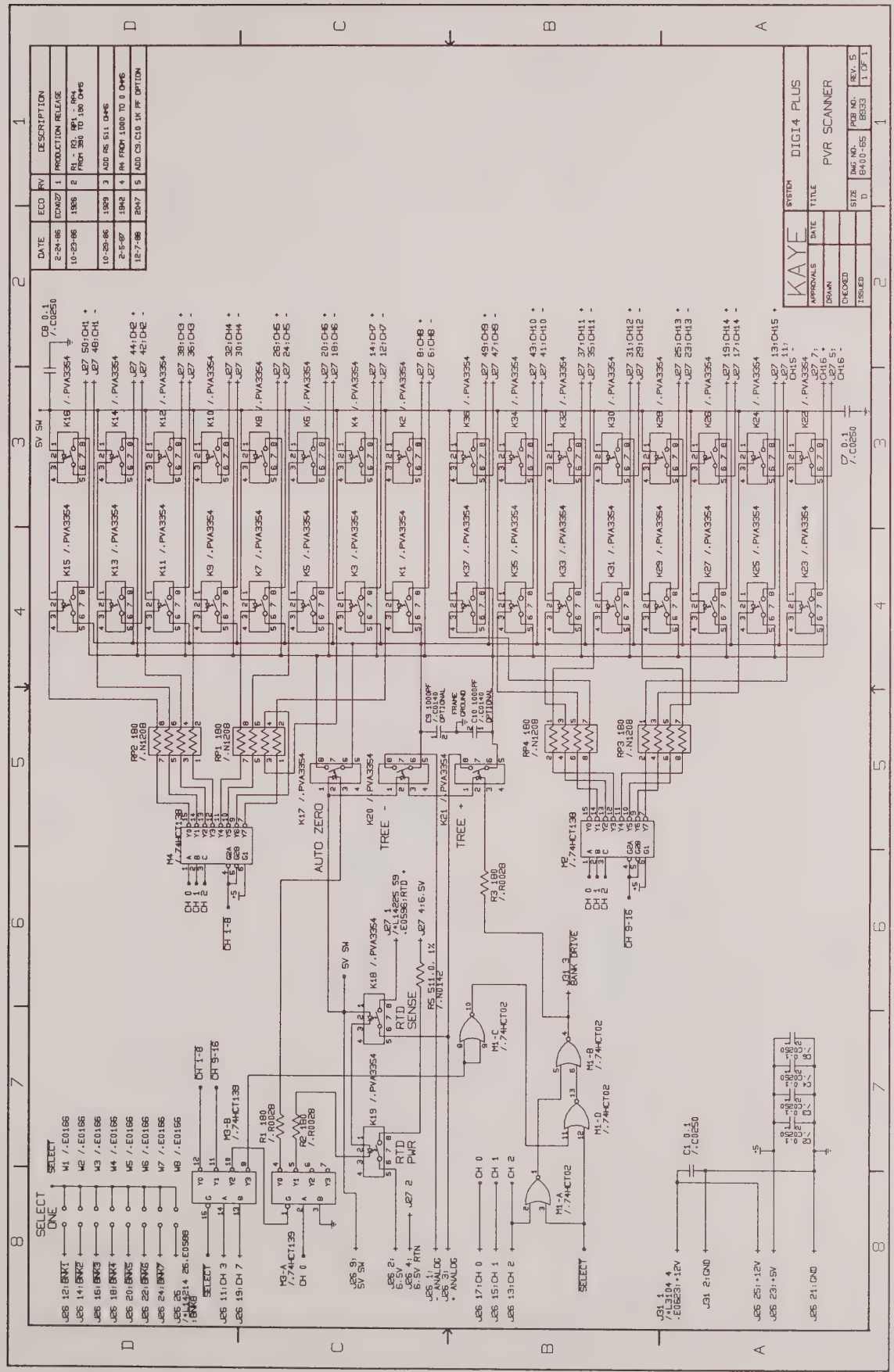

8400-64
REV 9
+15VA
-15VA
+5V
+5VL
R54 33K
R53 6.8K
O.C.
M82
OCTST
(1-B3)
R55 2.7K
(2) 2N5351
Q7
Q6
R83 5360*
R82 2740*
M81
CG5 .1 200V
RSTFLTR
(1-C4)
C73 C74 .1
M90 LM308N
C70 33PF 200V
CG7 .1
CG8 .1 200V
DISCFILTER
(1-C4)
R10 4.02K*
+15V UNREG
VR4 LM399H
R200 402*
R9 20K**
R11 1.18K*
R12 590*
R13 294*
R14 147*
W8
W4
W2
W1
6.5V
-6.5V
P1 200
P2 200
R15 20K*
R16 20K**
R16A 499K*
R17 20K*
R18 6.8K
L3 100 UH 2.5A
L4 100 UH 2.5A
J26
6.5535V
ANALOG GND
C19 (4).1 UF
C18 C20
C21
M99 714TC
M98 714TC
-VREF (2-A3)
+VREF (2-B3)
M96 POS (1-B4) (2-A3)
M92 NEG (1-B4) (2-A3)
ANALOG HI
R80 3.9K 2 WATT
R81 390
C82 .1 200V
D10 1.5KE30C
C64 .01 100V
ANALOG LO
L2 100 UH 2.5A
CG3 SPG2 SPARK GAP .75PF, 1-2KV
M80 714TC
R86 5360*
M82
(1-C4) CONV
(1-C4) RSTG,5
(1-C5) DISCFILTER
R70 1K
C57 .1 200V
ANALOG GND
BUF INP
R87 1K
R84 4.7K
R114 4.7K
(1-D4) OPEN
M72
R110 20K
R113 2.80K*
R113 10M
R117 22K
D13 IN914
R104 22K
R105 22K
R108 22K
R106 330
R107 10M
R109 10M
R112 330
R111 22K
N72 LM339N
R103 22K
R116 22K
D12 IN914
OVRG (1-C7)
M91 714TC ADOPO7DN
C72 C69 .1
R88 4.7K
AMP OUT
M92
R71 3G.5K*
R72 3.32M*
P3 50
650MV
6.5V (1-D6)
650MV (1-D6)
R31 3G50*
R92 226K*
P4 20
R93 4.7
65MV
65MV (1-D6)
R94 200*
R95 21K*
P5 20
R96 4.7
R97 4.7
32MV
32MV (1-D6)
R98 200*
M96 UPINT 1-A6,B3,C3,C7
INT (1-B3) (2-C3)
R40 121K*
PTF56
R36
R35
R34 (3)121K*
(1-B3) (2-B4)
INT
DG201CJ (TYP)
M97
C38 .1 200V
C37 C40
M95 LF356N
R33 1K*
C36 220PF
M94 COMP02
R31 3.3K
D11 IN914
SETP (1-A6)
R39 121*
R41 7.68K*
R102 7.68K*
R32 200K*
R37 121*
+VREF (2-C1)
-VREF (2-C2)
POS (1-B4) (2-C2)
NEG (1-B4) (2-C1)
OPEN CKT, INPUT FILTER
ANALOG CKT, GAIN SWITCHED AMPLIFIER
DUAL SLOPE INTEGRATOR, OUTPUT POLARITY
KAYE INSTRUMENTS
SYSTEM DIGI 4 PLUS
TITLE 4 PLUS ANALOG
SCALE —
SHEET 2 OF 3
P.C. BD NO. 80923
DWG. NO. 8400-64
REV 9
B-17
REV 05/02/89

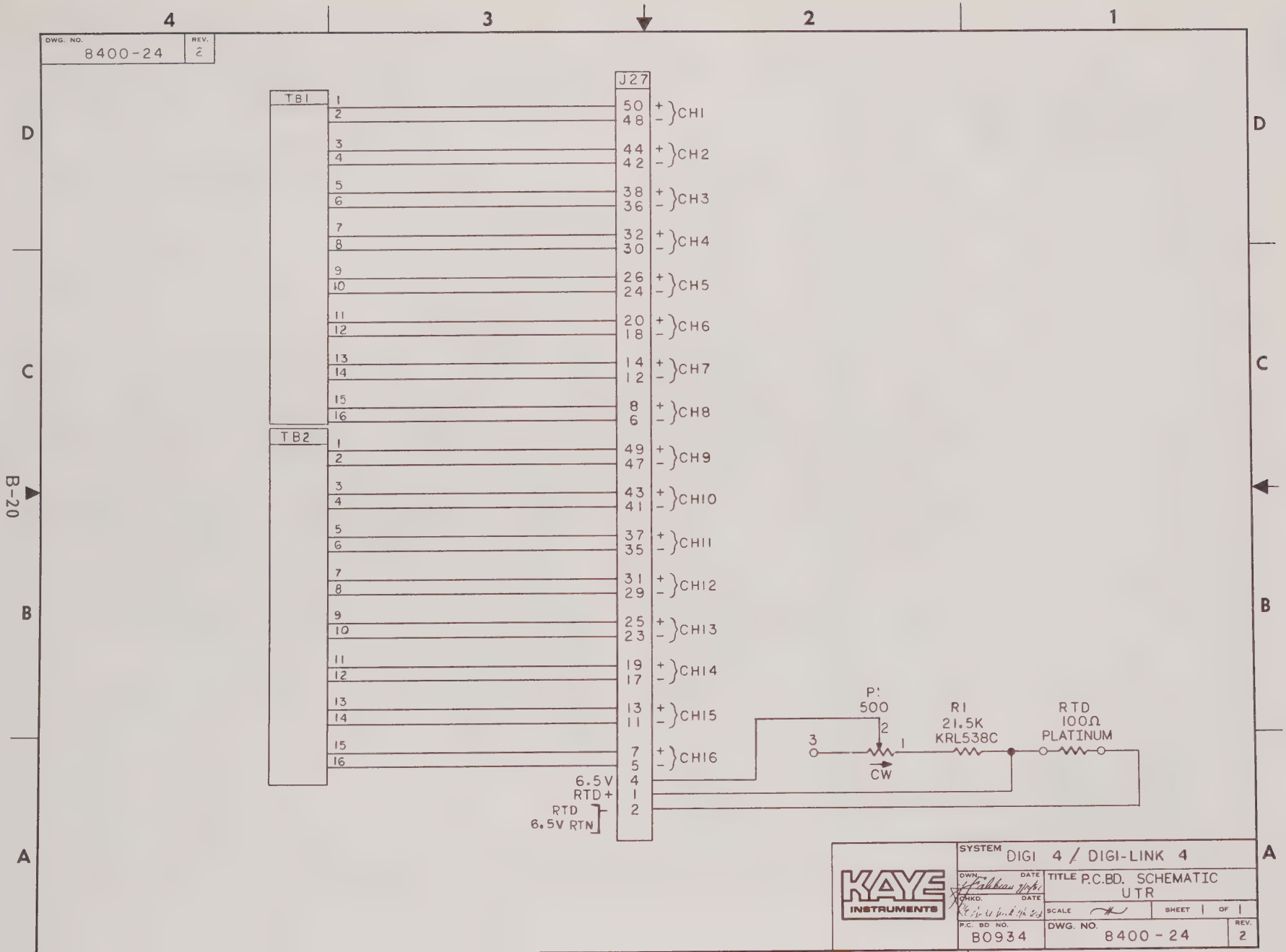
REV 05/02/89



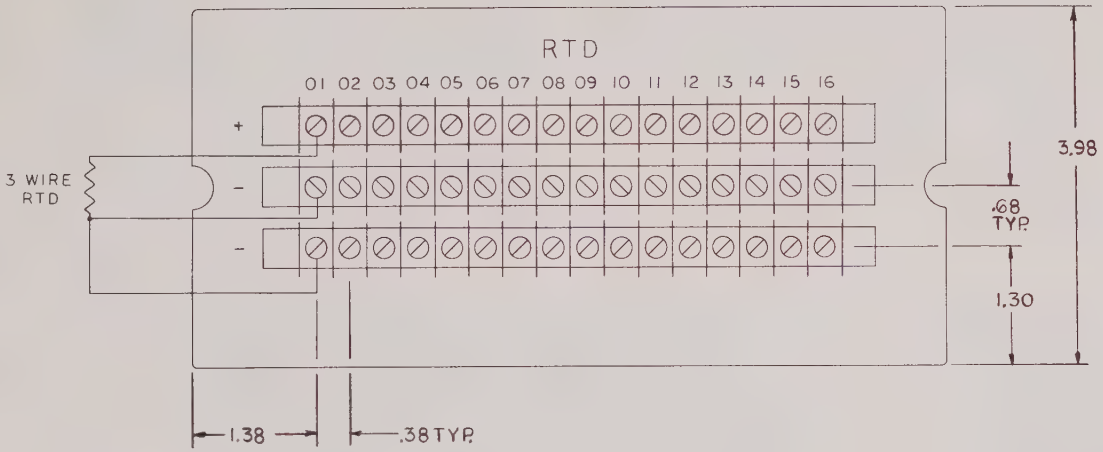
DATE	ECO NO	REV	DESCRIPTION
3 20 89	ECO 2060	9	R16A WAS 634K
2 1 89	ECO 2051	8	ADDED PADS FOR FUTURE TI
12 13 88	ECO 2047	8	SEE ECO
2-29 88	ECO 2010	7	26,07 " "
1-19-88	ECO 1969	6	
4-21 87	ECO 1957		
3-12-87	ECO 1949	5	SEE ECO
2-3-87	ECO 1939	4	SEE ECO
12 4 86	ECO 1931	3	SEE ECO
9 9 86	ECN 280A	2	R16A WAS 634K

SYSTEM: DIGI 4 PLUS
TITLE: 4 PLUS ANALOG
KAYE INSTRUMENTS
PC BD NO. B0923
DWG NO 8400-64 REV 9
SHEET 3 OF 3


KAYE
DIGI4 PLUS
PVR SCANNER
DWG NO. 8400-155
PCB NO. 8833
REV. 5
SIZE D
SHEET 1 OF 1
DESCRIPTION
PRODUCTION RELEASE
R1 - R3, RP1 - RP4 FROM 330 TO 100 OHMS
ADD R5 511 OHMS
R4 FROM 1000 TO 0 OHMS
ADD C9,C10 1K PF OPTION
AUTO ZERO
TREE -
TREE +
RTD SENSE
RTD PWR
SELECT ONE
SELECT
BANK DRIVE
5V SW
CH 0
CH 1
CH 2
CH 1-8
CH 9-16
ANALOG
SELECT
GROUND
FRAME
OPTIONAL


DWG. NO. 8400-24
REV. 2
4
3
2
1
D
C
B
A
B-20
TB1
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
TB2
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
J27
50 + 48 - CH1
44 + 42 - CH2
38 + 36 - CH3
32 + 30 - CH4
26 + 24 - CH5
20 + 18 - CH6
14 + 12 - CH7
8 + 6 - CH8
49 + 47 - CH9
43 + 41 - CH10
37 + 35 - CH11
31 + 29 - CH12
25 + 23 - CH13
19 + 17 - CH14
13 + 11 - CH15
7 + 5 - CH16
6.5V 4
RTD+ 1
RTD 6.5V RTN 2
P1 500
3
2
1
CW
R1 21.5K KRL538C
RTD 100Ω PLATINUM
KAYE INSTRUMENTS
SYSTEM DIGI 4 / DIGI-LINK 4
DWN Falkhau 11/9/81
DATE
CHKD.
DATE
TITLE P.C.BD. SCHEMATIC UTR
SCALE
SHEET 1 OF 1
P.C. BD NO. B0934
DWG. NO. 8400-24
REV. 2

REVISIONS				
NO.	ECO	DESCRIPTION	CHKD	DATE
1	ECN 347	DWG NO WAS 1365-60	BDW	10-2-87



B-21

10/07/88

-3	-2	-1	PART NO.	DESCRIPTION	ITEM NO.
QTY REQ'D					

MATERIAL: ———

FINISH: ———

QTY PER ASSY ——

DWG. SCALE FULL

DWN. P.B DATE 2-9-84

CHKD. BDW DATE 2/87

DO NOT SCALE DRAWING

SYSTEM: D4

TITLE: RTD - EXTERNAL WIRE HOOKUP

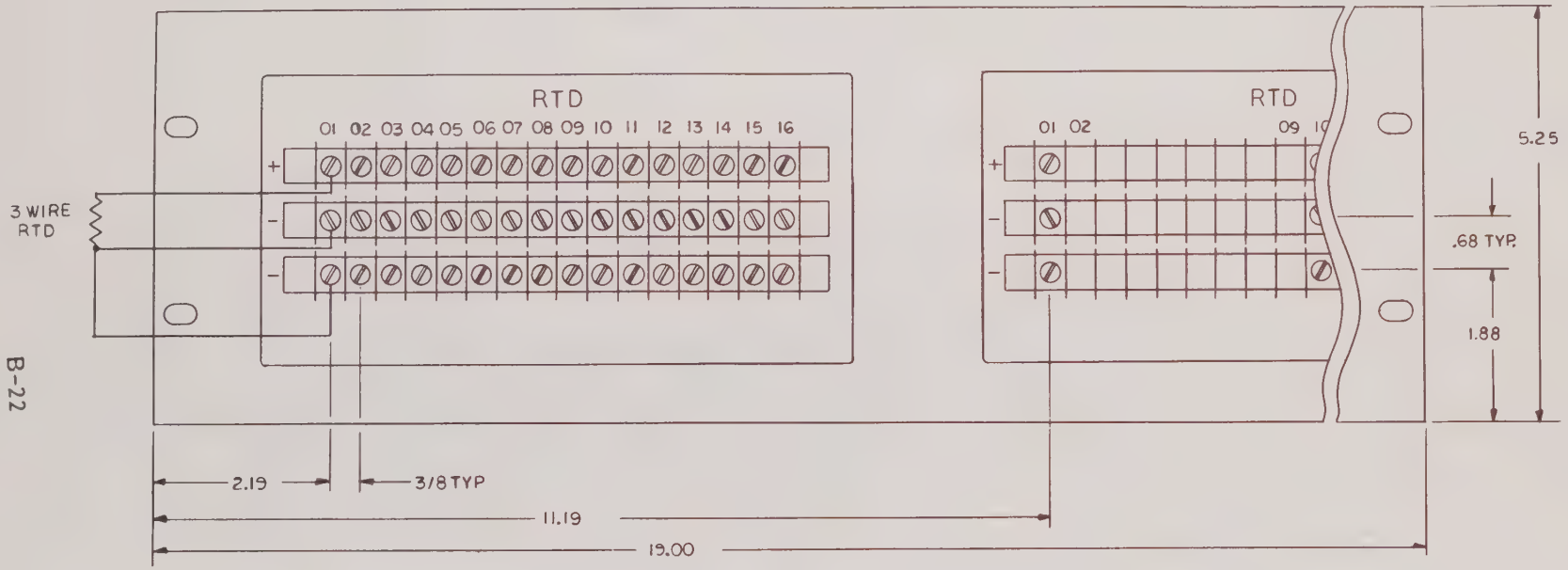
KAYE INSTRUMENTS

UNLESS OTHERWISE SPECIFIED: TOLER. ±1/32 - XX± 02 - .XXX± .005 - 4.± 30' .060R ALL SHARP CORNERS REMOVE BURRS & BREAK SHARP EDGES. ALL DIM. IN INCHES - - MACHINE FINISH-125

DWG. NO. C1380-92 REV 1

STK NO. ——— SH 1 OF 1

REVISIONS				
NO.	ECO	DESCRIPTION	CHKD	DATE



B-22

-3	-2	-1	PART NO.	DESCRIPTION	ITEM NO.
QTY. REQ'D					

MATERIAL:

FINISH:

QTY. PER ASSY. —

DWG. SCALE —

DWN. GDW DATE 2-18-86

CHKD. DATE

DO NOT SCALE DRAWING

SYSTEM: NL4

TITLE: RTD PANEL OUTLINE DWG

DWG. NO. C1365-97 REV 0

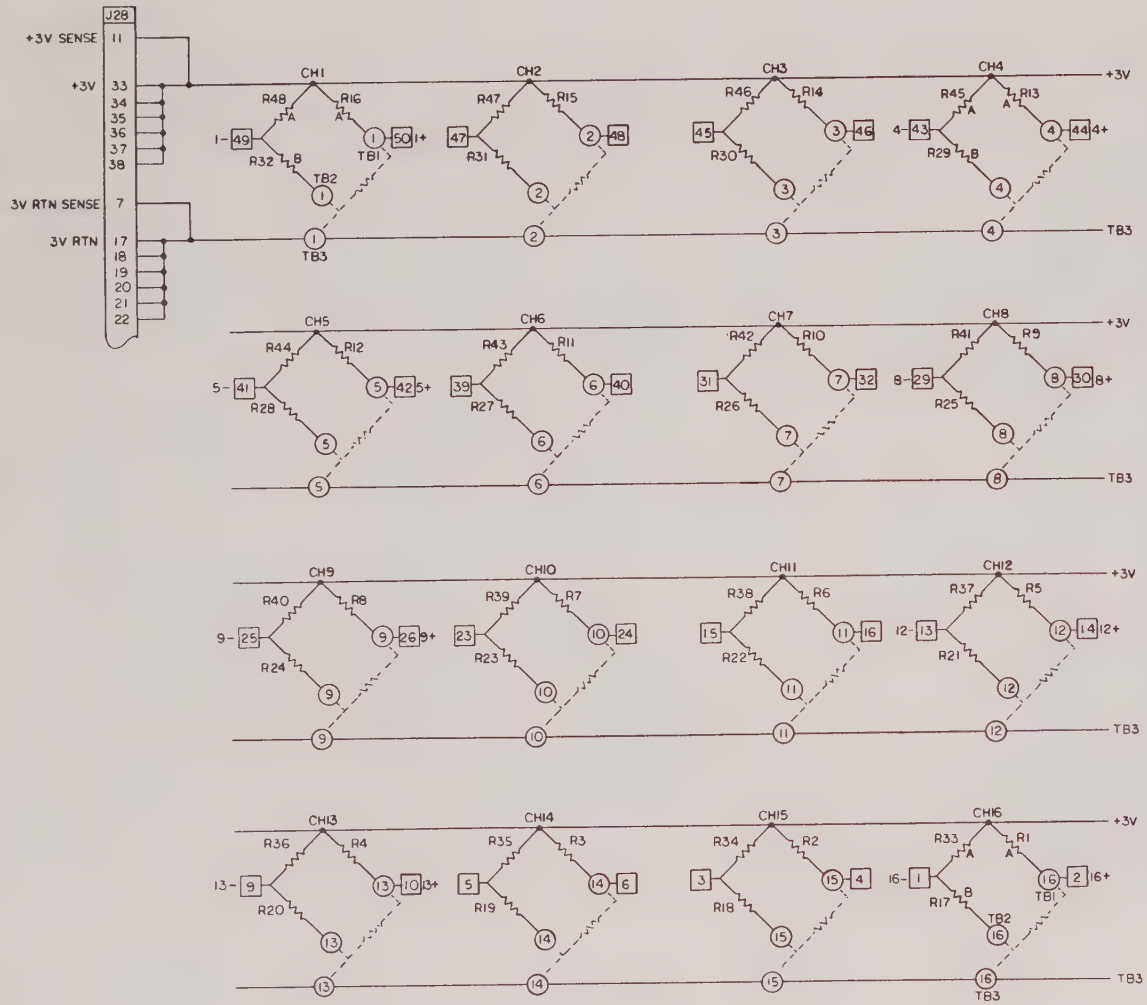
STK. NO. SH 1 OF 1

KAYE INSTRUMENTS

UNLESS OTHERWISE SPECIFIED:
TOLER. ±1/32 - XX± .02 - XXX± .006 - ∠± 30'
.060 R ALL SHARP CORNERS
REMOVE BURRS & BREAK SHARP EDGES.
ALL DIMS. IN INCHES - - MACHINE FINISH 125

8400-37 | REV 1

TABLE I			
		A	B
80996 A	100 OHM PT RTD 0.01 (C)	5.5K KRL250	100 OHM KRL250
80996 B	100 OHM PT RTD 0.1 F (C)	3.3K KRL250	100 OHM KRL250
80996 C	10 OHM CU RTD CU RTD	3.3K KRL250	9.04 OHM

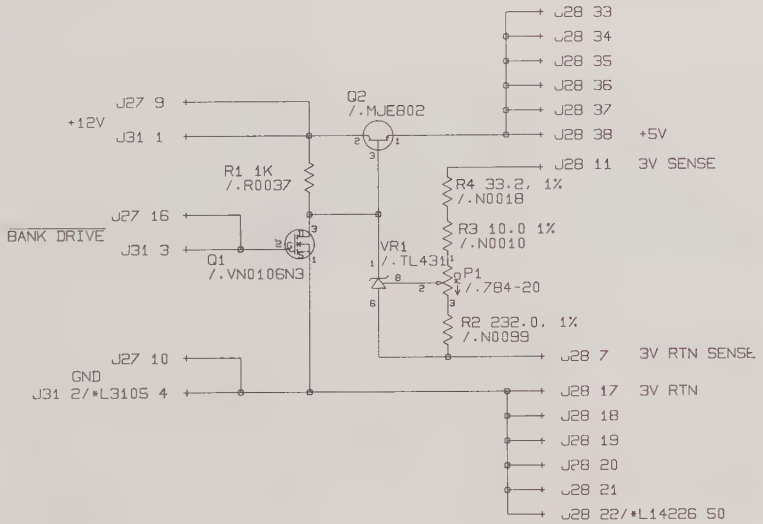


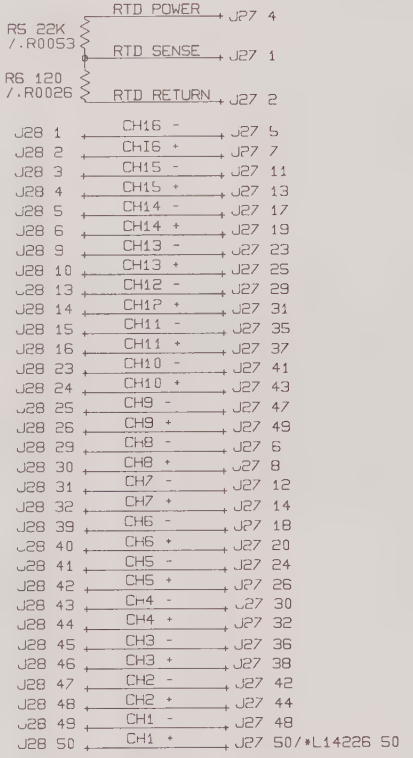
NOTE: □ DENOTES J28
○ DENOTES TERMINAL BLOCK

KAYE INSTRUMENTS

SYSTEM DIGI-LINK 4/DIGI 4
DWN LUCAS 1/8/84
CHKD S.W. 3/15/84
TITLE RTD CONDITIONER P.C. BD. SCHEMATIC DWG.
SCALE NONE SHEET 1 OF 1
P.C. BD NO 80996
DWG NO 8400-37
REV 1

B-23

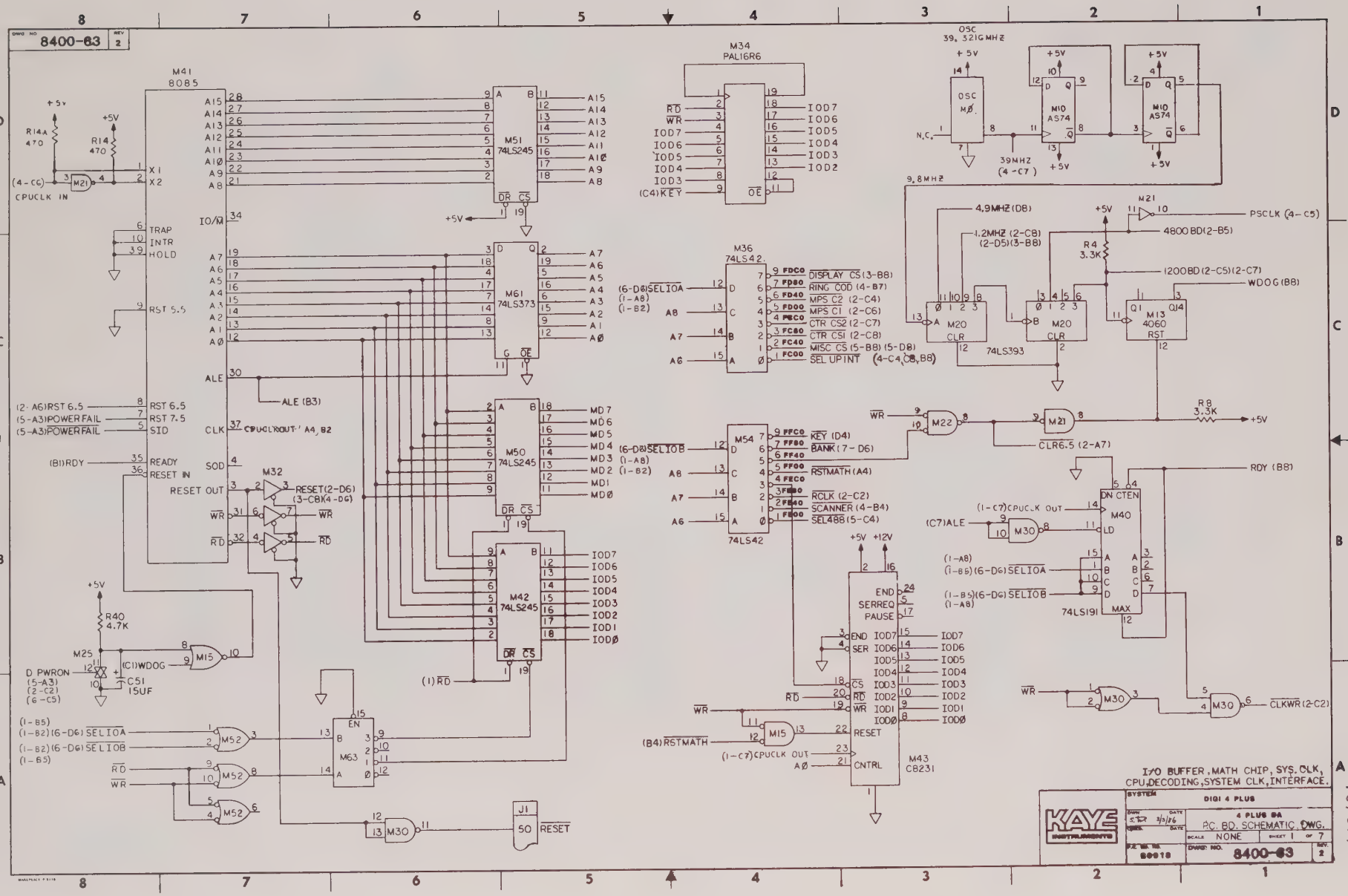


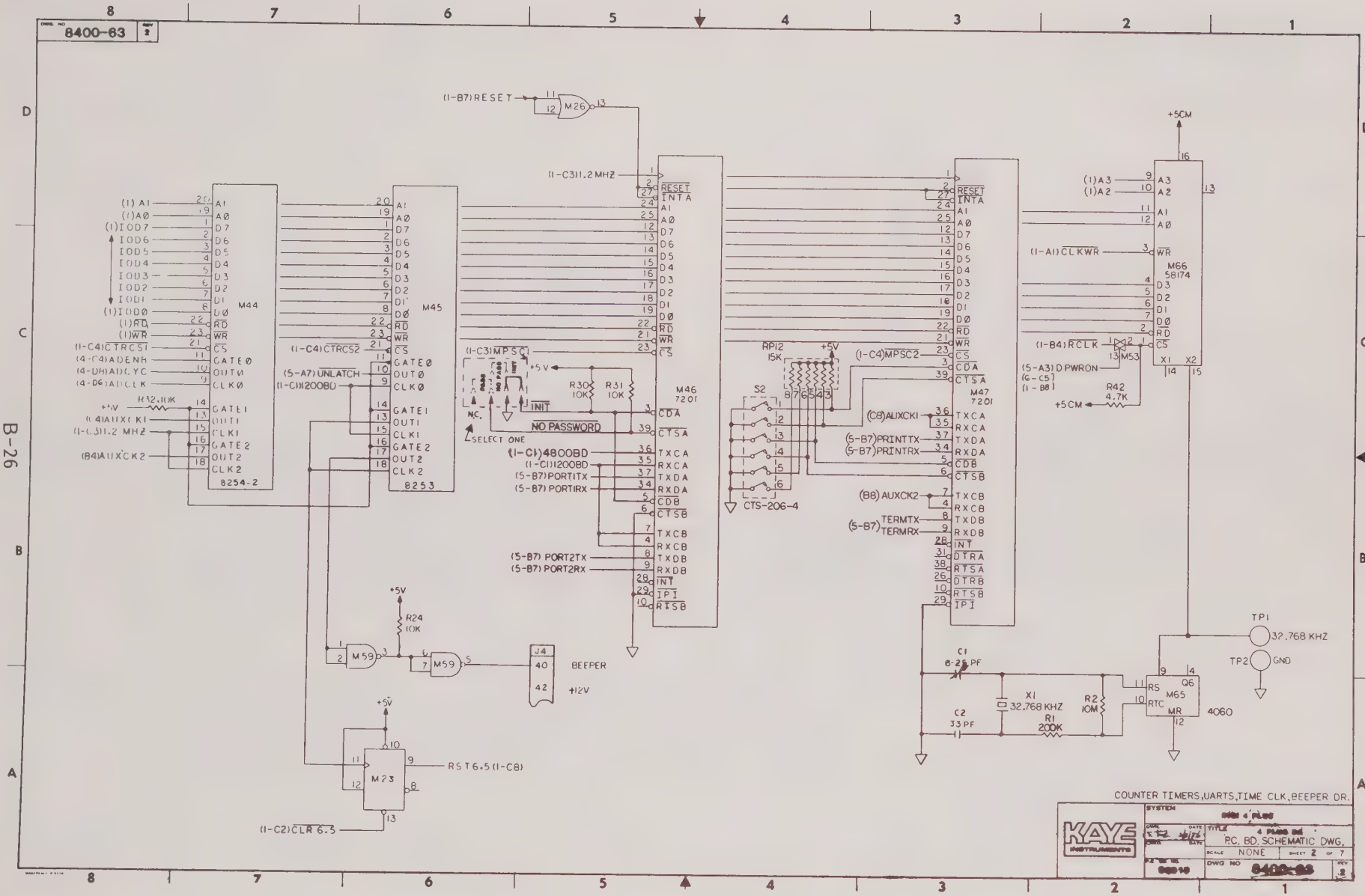


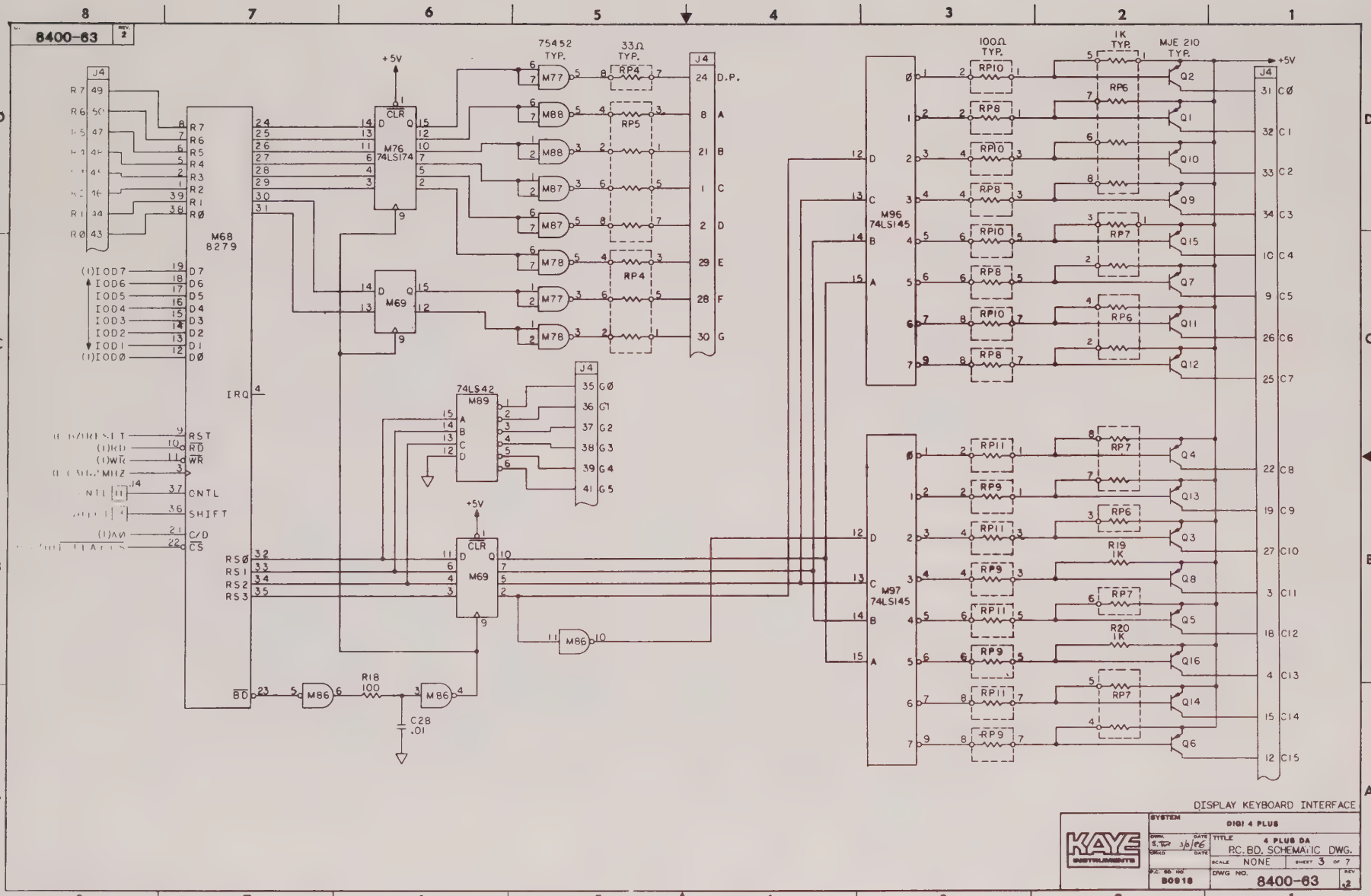
KAYE		SYSTEM: DIGI 4 AND 4+			
APPROVALS	DATE	TITLE: RTD INTERFACE			
DRAWN					
CHECKED RBH	7/15/87	SIZE	DWG NO.	PCB NO.	REV.
ISSUED DOW	8-3-87	D	8400-66	B0985	3
					1 OF 1

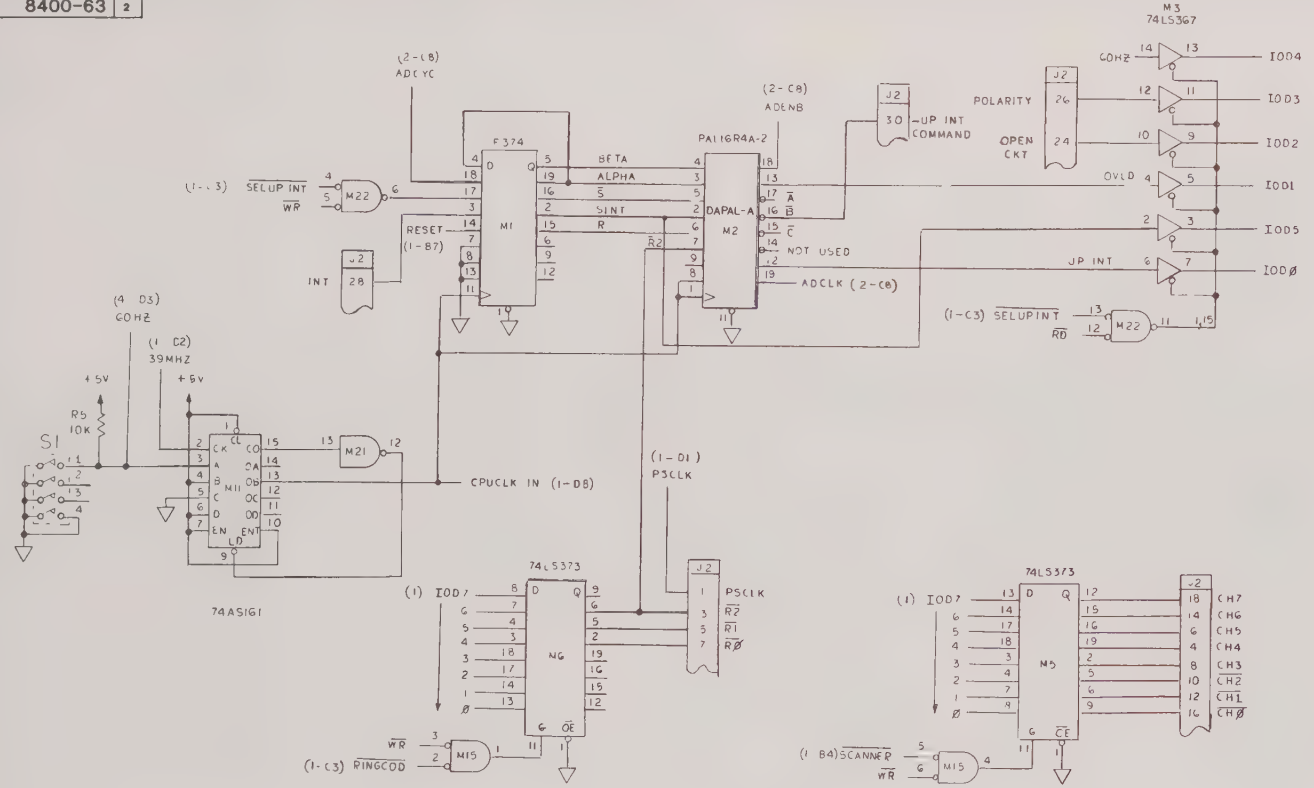
B-24

10/07/88


8400-63
M41
8085
M51
74LS245
M61
74LS373
M50
74LS245
M42
74LS245
M34
PAL16R6
M36
74LS42
M54
74LS42
M63
EN
M43
CB231
M40
DN CTEN
MAX
74LS191
M20
CLR
74LS393
M13
4060
RST
OSC
39.321GMHZ
M10
AS74
9.8MHZ
4.9MHZ(D8)
1.2MHZ (2-C8)
(2-D5)(3-B8)
4800BD(2-B5)
1200BD(2-C5)(2-C7)
WDOG(B8)
PSCLK (4-C5)
CPUCLK IN
ALE (B3)
RESET(2-D6)
(3-CBK4-D6)
RESET OUT
RST 6.5
RST 7.5
SID
READY
RESET IN
TRAP
INTR
HOLD
IO/M
CPUCLKOUT' A4, B2
DISPLAY CS(3-B8)
RING COD (4-B7)
MPS C2 (2-C4)
MPS C1 (2-C6)
CTR CS2 (2-C7)
CTR CS1 (2-C8)
MISC CS (5-B8) (5-D8)
SEL UPINT (4-C4,C8,B8)
KEY (D4)
BANK (7-D6)
RSTMATH (A4)
RCLK (2-C2)
SCANNER (4-B4)
SEL488 (5-C4)
CLR6.5 (2-A7)
RDY (B8)
CLKWR(2-C2)
D PWRON
WDOG
RESET
I/O BUFFER, MATH CHIP, SYS. CLK,
CPU, DECODING, SYSTEM CLK, INTERFACE.
KAYE INSTRUMENTS
DIGI 4 PLUS
4 PLUS 8A
P.C. BD. SCHEMATIC
NONE
8400-63
10/07/88

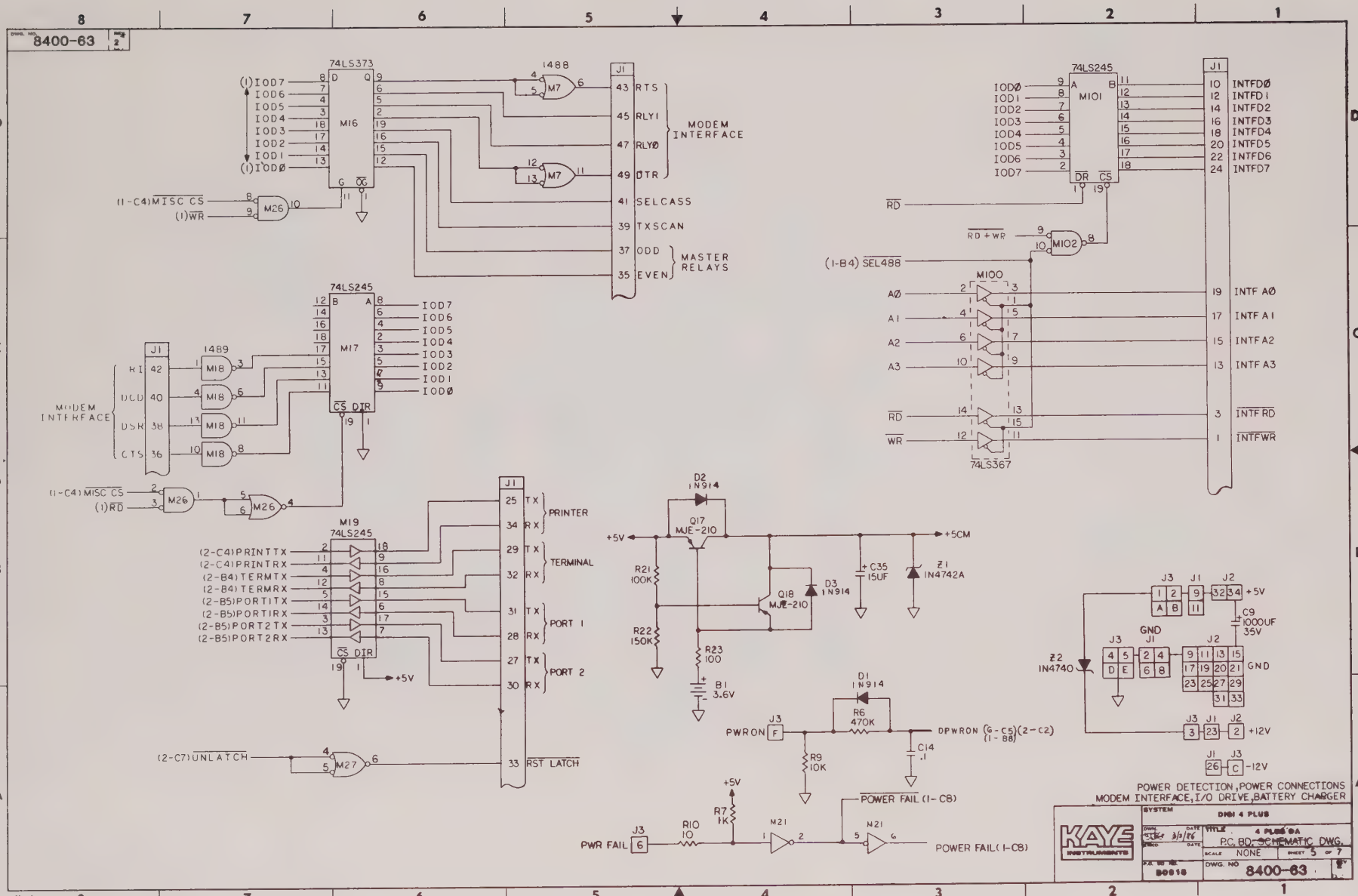

8400-63
(1-B7)RESET
M26
(1-C3)1.2 MHZ
M44
8254-2
M45
8253
M46
7201
M47
7201
M53
M66
58174
M59
M23
M65
4060
S2
CTS-206-4
RPI2
15K
R30
10K
R31
10K
R24
10K
R32,10K
R42
4.7K
R1
200K
R2
10M
C1
6-25 PF
C2
33 PF
X1
32.768 KHZ
TP1
32.768 KHZ
TP2
GND
J4
BEEPER
+12V
+5V
+5CM
(1-C4)CTRCS1
(1-C4)CTRCS2
(1-C3)MPSC1
(1-C4)MPSC2
(5-A7)UNLATCH
(1-C1)1200BD
(1-C1)4800BD
(1-C4)AUXCK1
(B4)AUXCK2
(1-B4)RCLK
(5-A3)D.PWRON
(G-C5)
(1-B8)
(1-A1)CLKWR
(5-B7)PORTITX
(5-B7)PORTIRX
(5-B7)PORT2TX
(5-B7)PORT2RX
(5-B7)PRINTTX
(5-B7)PRINTRX
(5-B7)TERMTX
(5-B7)TERMRX
(1-C2)CLR 6.5
RST 6.5 (1-C8)
INIT
NO PASSWORD
SELECT ONE
N.C.
COUNTER TIMERS,UARTS,TIME CLK,BEEPER DR.
KAYE INSTRUMENTS
P.C. BD. SCHEMATIC DWG.
NONE
8400-63
10/07/88
B-26

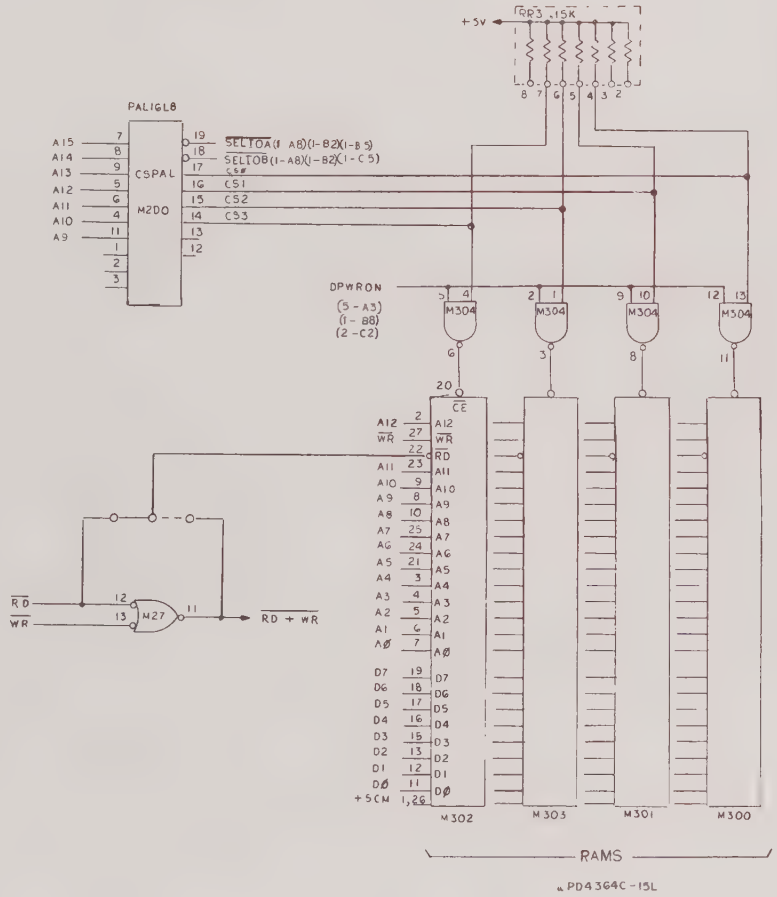

8400-63
REV. 2
J4
M68
8279
M76
74LS174
M69
74LS42
M89
M96
74LS145
M97
74LS145
75452
TYP.
33Ω
TYP.
100Ω
TYP.
1K
TYP.
MJE 210
TYP.
+5V
RP4
RP5
RP10
RP6
RP8
RP7
RP11
RP9
R18
100
R19
1K
R20
1K
C28
.01
M86
Q1
Q2
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16
D.P.
IRQ
RST
RD
WR
CNTL
SHIFT
C/D
CS
BD
DISPLAY KEYBOARD INTERFACE
KAYE INSTRUMENTS
SYSTEM
DIGI 4 PLUS
TITLE
4 PLUS DA
P.C. BD. SCHEMATIC DWG.
SCALE NONE
SHEET 3 OF 7
P.C. BD. NO.
80918
DWG NO.
8400-63
REV. 2
10/07/88
B-27



KAYE INSTRUMENTS	SYSTEM	DIGI 4 PLUS	
DWN. SKP 5/2/86	TITLE	4 PLUS DA PC BD SCHEMATIC DWG	
CHKD.	SCALE NONE	SHEET 4 OF 7	
P.C. BD NO. B0818	DWG NO 8400-63	REV 2	

10/07/88

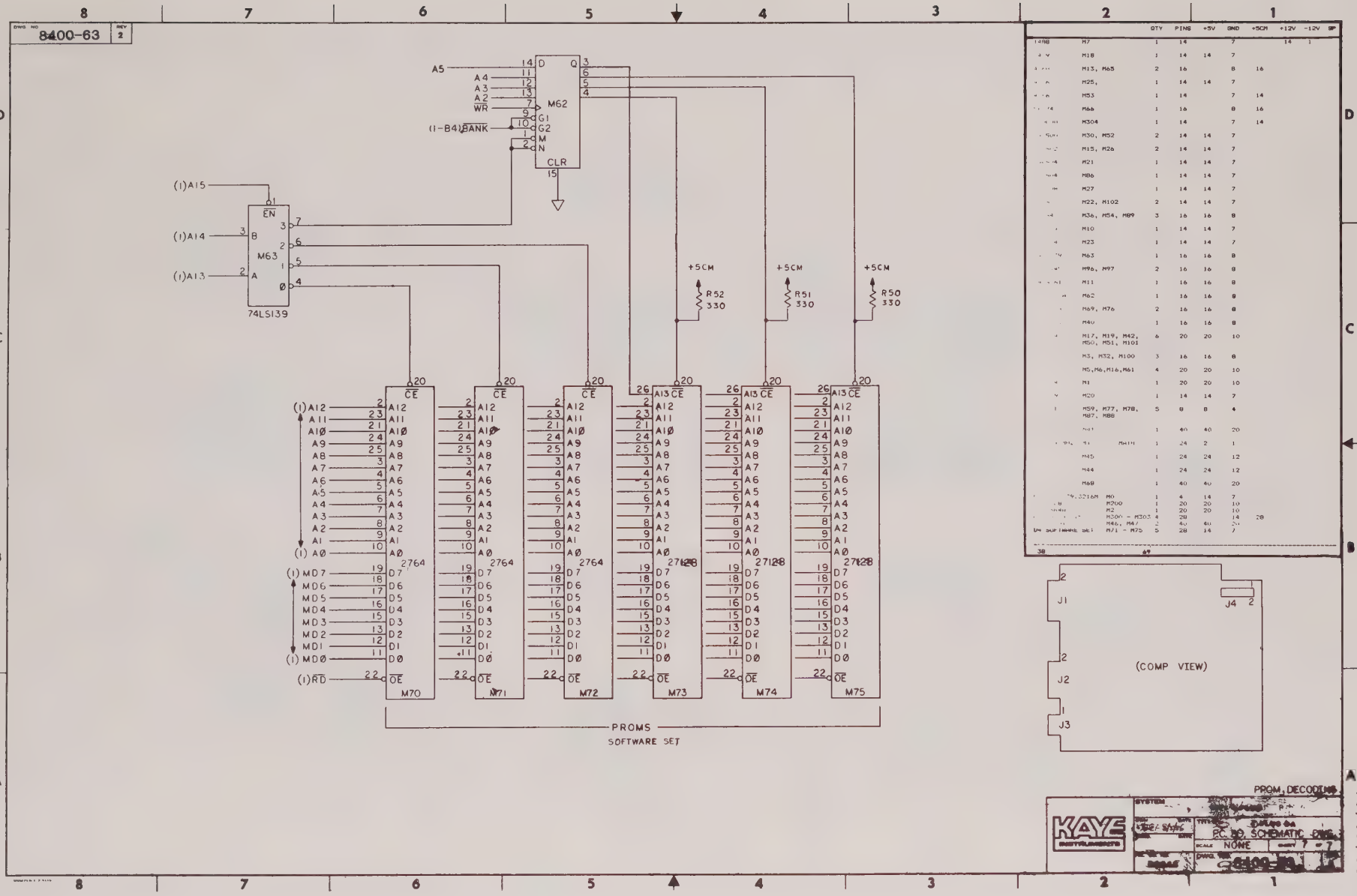

8400-63
74LS373
M16
1488
M7
J1
43 RTS
45 RLY1
47 RLYØ
49 ØTR
MODEM INTERFACE
41 SELCASS
39 TXSCAN
37 ODD
35 EVEN
MASTER RELAYS
(1)IOD7
IOD6
IOD5
IOD4
IOD3
IOD2
IOD1
(1)IODØ
(1-C4)MISC CS
(1)WR
M26
74LS245
MI01
IODØ
IOD1
IOD2
IOD3
IOD4
IOD5
IOD6
IOD7
DR CS
RD
RD + WR
MI02
(1-B4) SEL488
MI00
AØ
A1
A2
A3
74LS367
INTFDØ
INTFD1
INTFD2
INTFD3
INTFD4
INTFD5
INTFD6
INTFD7
INTF AØ
INTF A1
INTF A2
INTF A3
INTF RD
INTF WR
MI7
1489
MI8
MODEM INTERFACE
RI
DCD
DSR
CTS
CS DIR
(1-C4)MISC CS
(1)RD
M19
(2-C4)PRINTTX
(2-C4)PRINTRX
(2-B4)TERMTX
(2-B4)TERMRX
(2-B5)PORTITX
(2-B5)PORTIRX
(2-B5)PORT2TX
(2-B5)PORT2RX
TX
RX
PRINTER
TERMINAL
PORT 1
PORT 2
+5V
(2-C7)UNLATCH
M27
RST LATCH
D2 1N914
Q17 MJE-210
Q18 MJE-210
D3 1N914
R21 100K
R22 150K
R23 100
B1 3.6V
C35 15UF
Z1 IN4742A
+5CM
D1 1N914
R6 470K
PWRON
DPWRON (G-C5)(2-C2) (1-B8)
R9 10K
C14 .1
POWER FAIL (1-C8)
R7 1K
R10 10
PWR FAIL
M21
POWER FAIL(1-C8)
J3
J1
J2
C9 1000UF 35V
Z2 IN4740
GND
+12V
-12V
POWER DETECTION, POWER CONNECTIONS
MODEM INTERFACE, I/O DRIVE, BATTERY CHARGER
KAYE INSTRUMENTS
SYSTEM DNN 4 PLUS
TITLE 4 PLUS OA
P.C. BD. SCHEMATIC DWG.
SCALE NONE
SHEET 5 OF 7
DWG. NO 8400-63
B-29
10/07/88



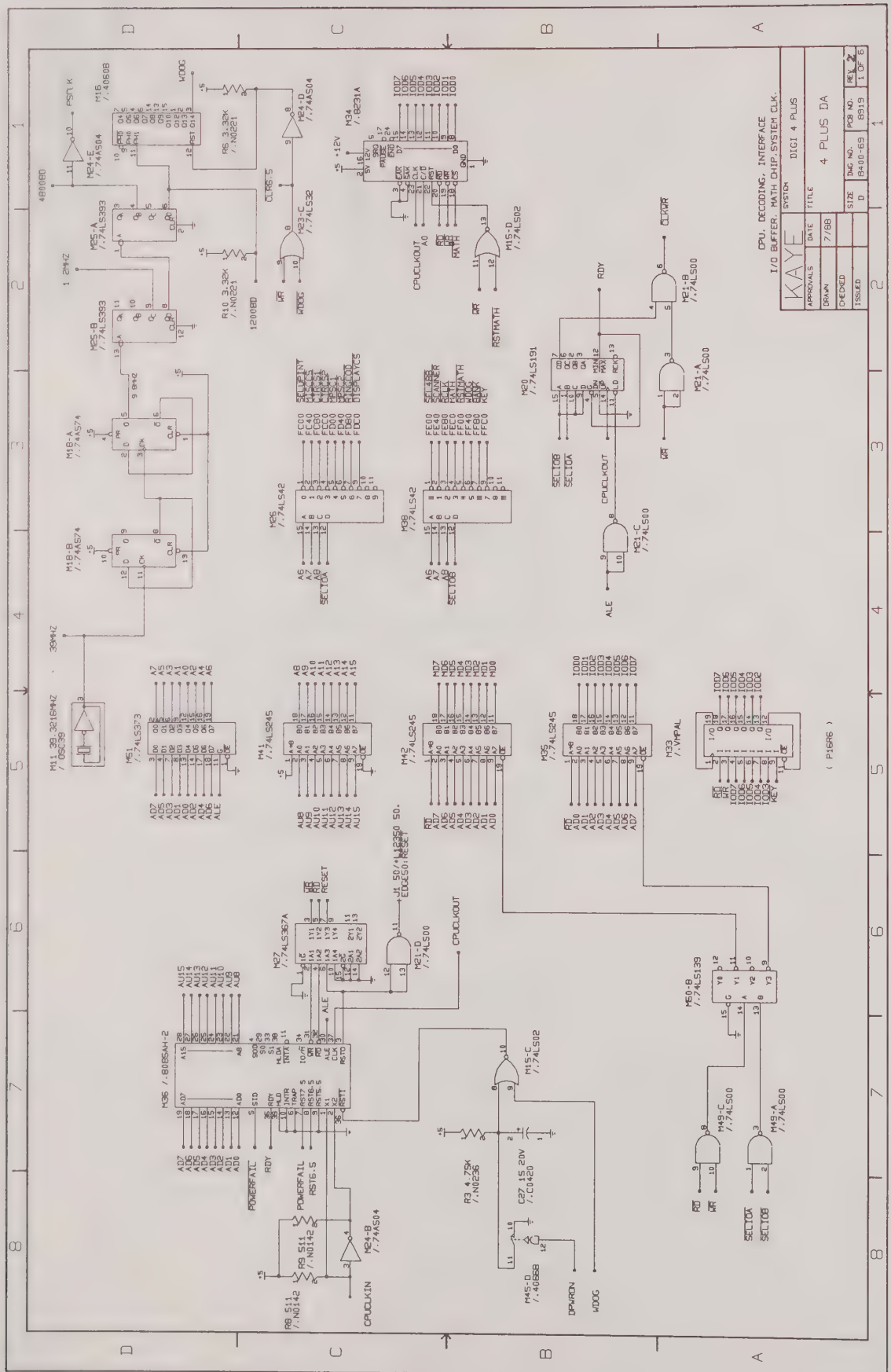
RAM DECODING

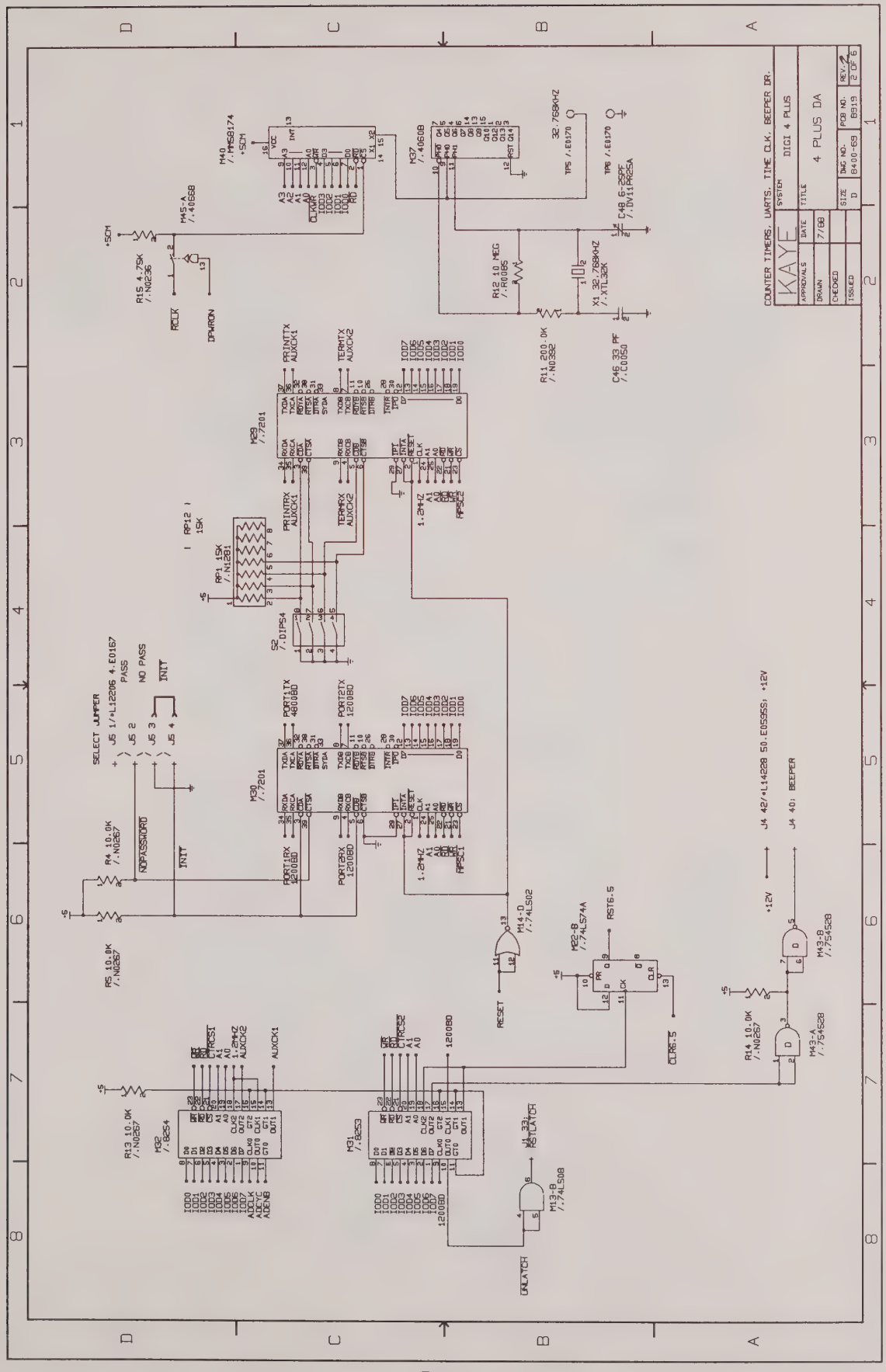
10/07/88

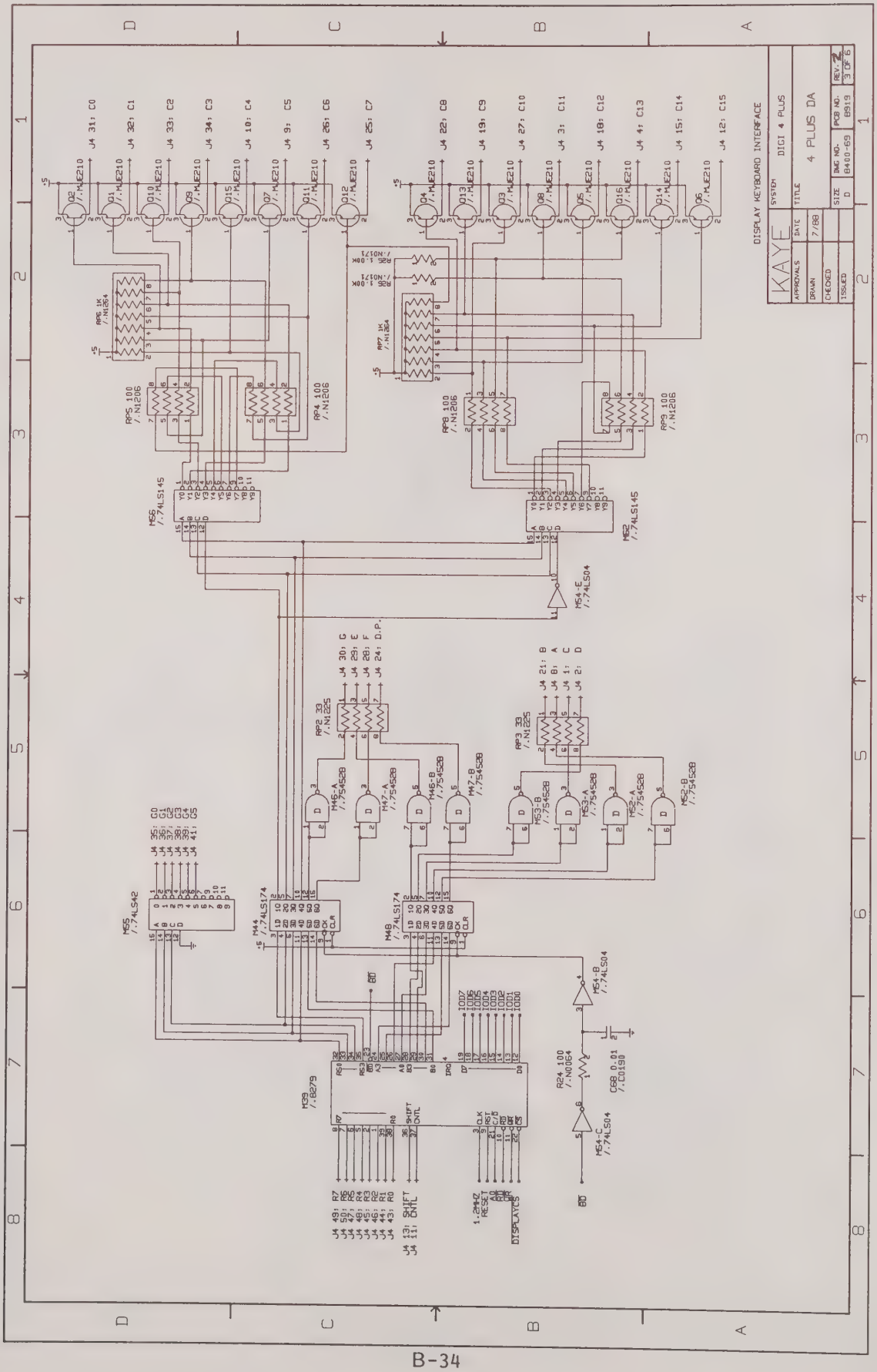
KAYE INSTRUMENTS	SYSTEM: DIGI 4 PLUS		
	DWN: J. TEP 3/1/86	TITLE: 4 PLUS DA PC BD SCHEMATIC DWG	
	CHKD DATE	SCALE: NONE	SHEET 2 OF 7
	P C BD NO: B0918	DWG NO: 8400-63	REV: 2

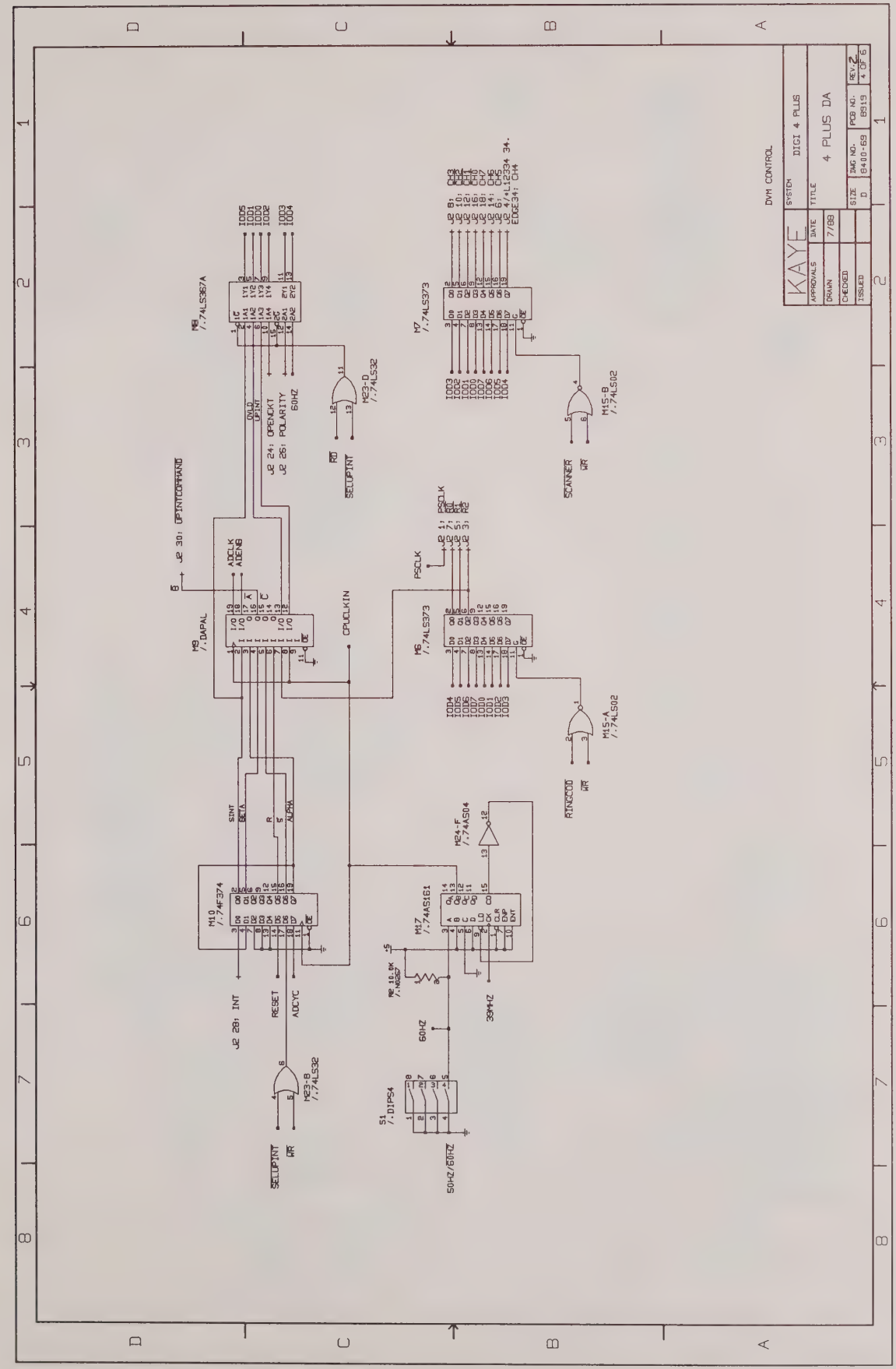


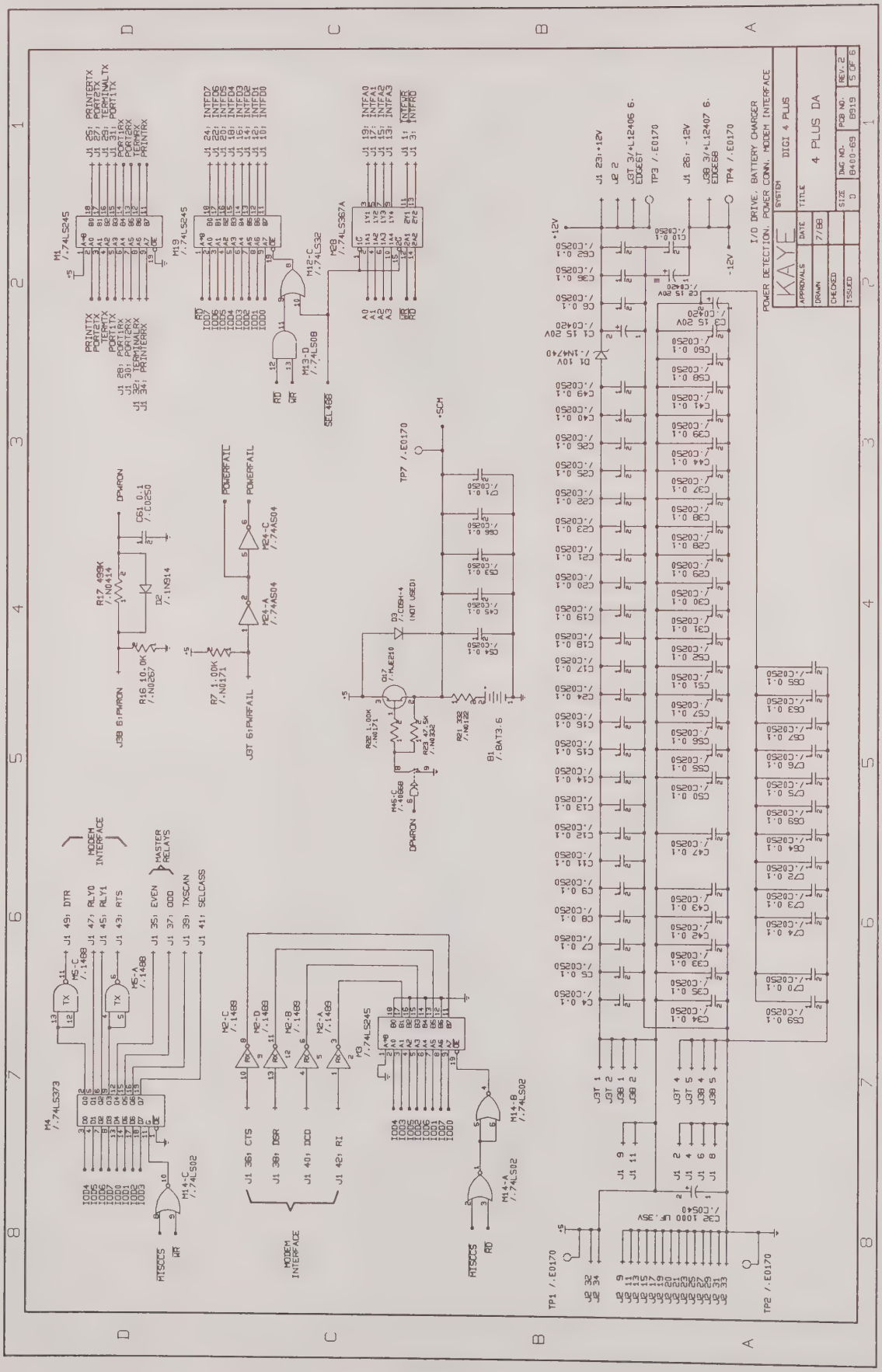
	QTY	PINS	+5V	GND	+5CM	+12V	-12V	BP
M7	1	14		7		14	1	
M18	1	14	14	7				
M13, M65	2	16		8	16			
M25,	1	14	14	7				
M53	1	14		7	14			
M66	1	16		8	16			
M304	1	14		7	14			
M30, M52	2	14	14	7				
M15, M26	2	14	14	7				
M21	1	14	14	7				
M86	1	14	14	7				
M27	1	14	14	7				
M22, M102	2	14	14	7				
M36, M54, M89	3	16	16	8				
M10	1	14	14	7				
M23	1	14	14	7				
M63	1	16	16	8				
M98, M97	2	16	16	8				
M11	1	16	16	8				
M62	1	16	16	8				
M69, M76	2	16	16	8				
M40	1	16	16	8				
M17, M19, M42, M50, M51, M101	6	20	20	10				
M3, M32, M100	3	16	16	8				
M5,M6,M16,M61	4	20	20	10				
M1	1	20	20	10				
M20	1	14	14	7				
M59, M77, M78, M87, M88	5	8	8	4				
	1	40	40	20				
M4(M)	1	24	2	1				
M45	1	24	24	12				
M44	1	24	24	12				
M68	1	40	40	20				
M0	1	4	14	7				
M200	1	20	20	10				
M2	1	20	20	10				
M300 - M303	4	28		14		28		
M46, M47	2	40	40	20				
M71 - M75	5	28	14	7				
	38		69					

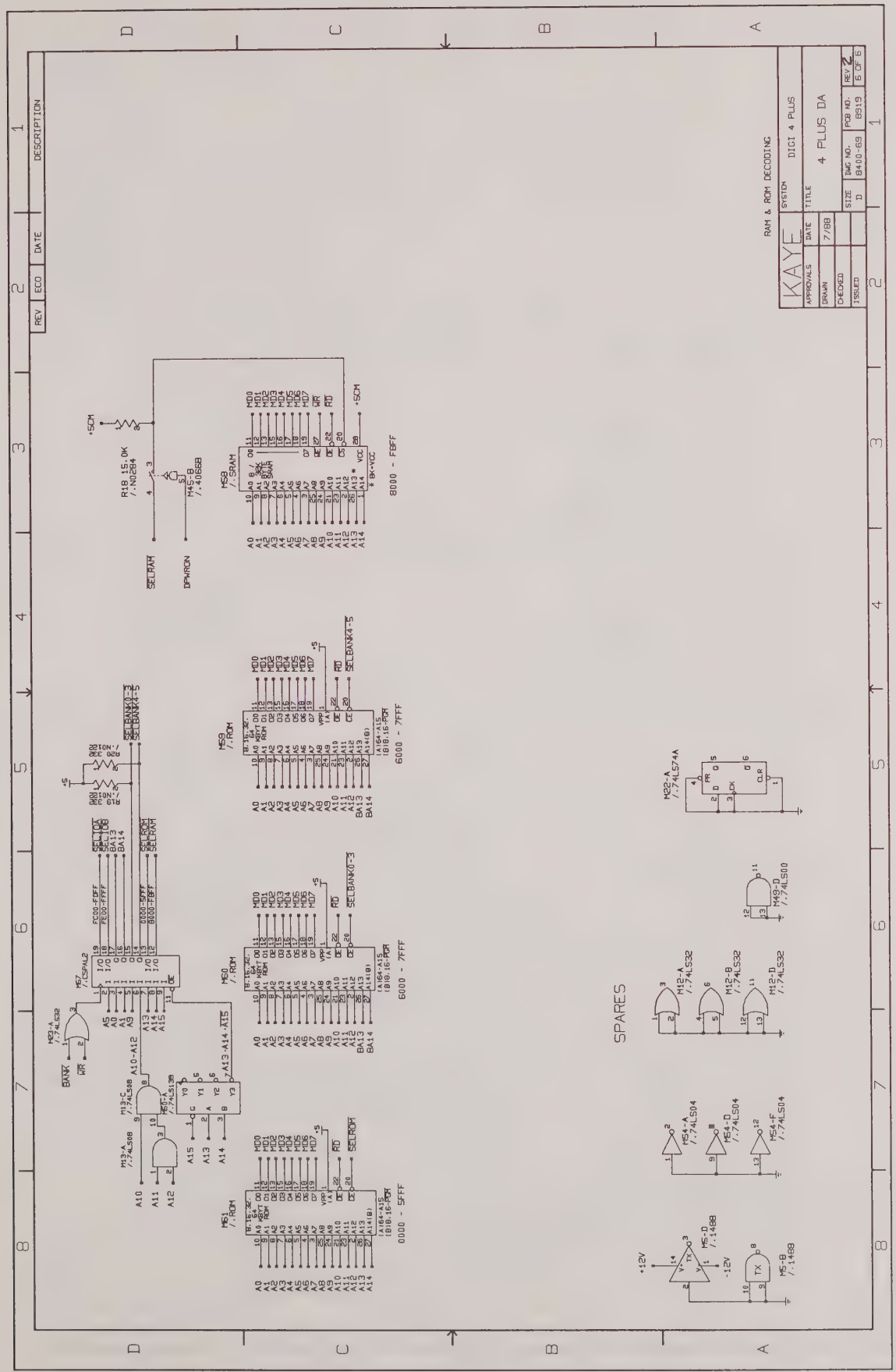

CPU, DECODING, INTERFACE
I/O BUFFER, MATH CHIP, SYSTEM CLK.
KAYE
APPROVALS
DRAWN
CHECKED
ISSUED
DATE
7/88
SYSTEM
DIGI 4 PLUS
TITLE
4 PLUS DA
SIZE
D
DWG NO.
8400-69
PCB NO.
8919
REV
1 OF 6
M36 /.80C86AH-2
M27 /.74LS367A
M42 /.74LS245
M41 /.74LS245
M35 /.74LS245
M33 /.VHPAL
M50-B /.74LS139
M34 /.8231A
M16 /.40608
M11 39.3216MHZ /.05C39
M1 /.74LS373
M5 /.74LS42
M38 /.74LS42
M8 /.74LS191
M18-A /.74AS74
M18-B /.74AS74
M5E-A /.74LS393
M5E-B /.74LS393
M24-A /.74AS04
M24-B /.74AS04
M24-C /.74LS32
M24-D /.74AS04
M24-E /.74AS04
M15-A /.74LS02
M15-B /.74LS02
M15-C /.74LS02
M15-D /.74LS02
M21-A /.74LS00
M21-B /.74LS00
M21-C /.74LS00
M21-D /.74LS00
M49-A /.74LS00
M49-C /.74LS00
M45-D /.40868
R3 4.75K /.N0238
R8 511 /.N0142
R10 3.32K /.N0221
R16 3.32K /.N0221
C27 15 20V /.C0420
J1 50/*.1"CSD EDGE50:RESET
(P16R6)


COUNTER TIMERS, UARTS, TIME CLK, BEEPER DR.
KAYE
SYSTEM DIGI 4 PLUS
TITLE 4 PLUS DA
APPROVALS
DRAWN
CHECKED
ISSUED
DATE 7/88
SIZE D
DWG NO. 8400-69
PCB NO. 8919
REV. 2
2 OF 6
SELECT JUMPER
J5 1/*L12206 4.E0167 PASS
J5 2 NO PASS
J5 3 INIT
J5 4
NOPASSWORD
INIT
R4 10.0K /.N0267
R5 10.0K /.N0267
R13 10.0K /.N0267
R14 10.0K /.N0267
R15 4.75K /.N0236
R11 200.0K /.N0332
R12 10 MEG /.R0085
C46 33 PF /.C0050
C48 6-25PF /.DV11PR25A
X1 32.768KHZ /.XTL32K
32.768KHZ
TP5 /.E0170
TP6 /.E0170
M40 /.74S0174 *SCM
M45-A /.40668
M37 /.4060B
M39 /.7201
M30 /.7201
M32 /.8254
M31 /.8253
M22-B /.74LS74A
M14-D /.74LS02
M13-B /.74LS08
M43-A /.7545128
M43-B /.7545128
U4 33 MSLATCH
S2 /.DIPS4
RP1 15K /.N1201
RP2 15K
PRINTTX AUXCK1
TERMTX AUXCK2
PORT1TX 4800BD
PORT2TX 1200BD
PORT1RX 4800BD
PORT2RX 1200BD
1.2MHZ AUXCK2
1.2MHZ AUXCK1
RESET
CLR6.5
RST6.5
MSLATCH
*12V
J4 42/*L14228 50.E0595S; *12V
J4 40: BEEPER
IOD0 IOD1 IOD2 IOD3 IOD4 IOD5 IOD6 IOD7
A0 A1 A2 A3 CS
RD WR
INT
RCLK
DPWRON

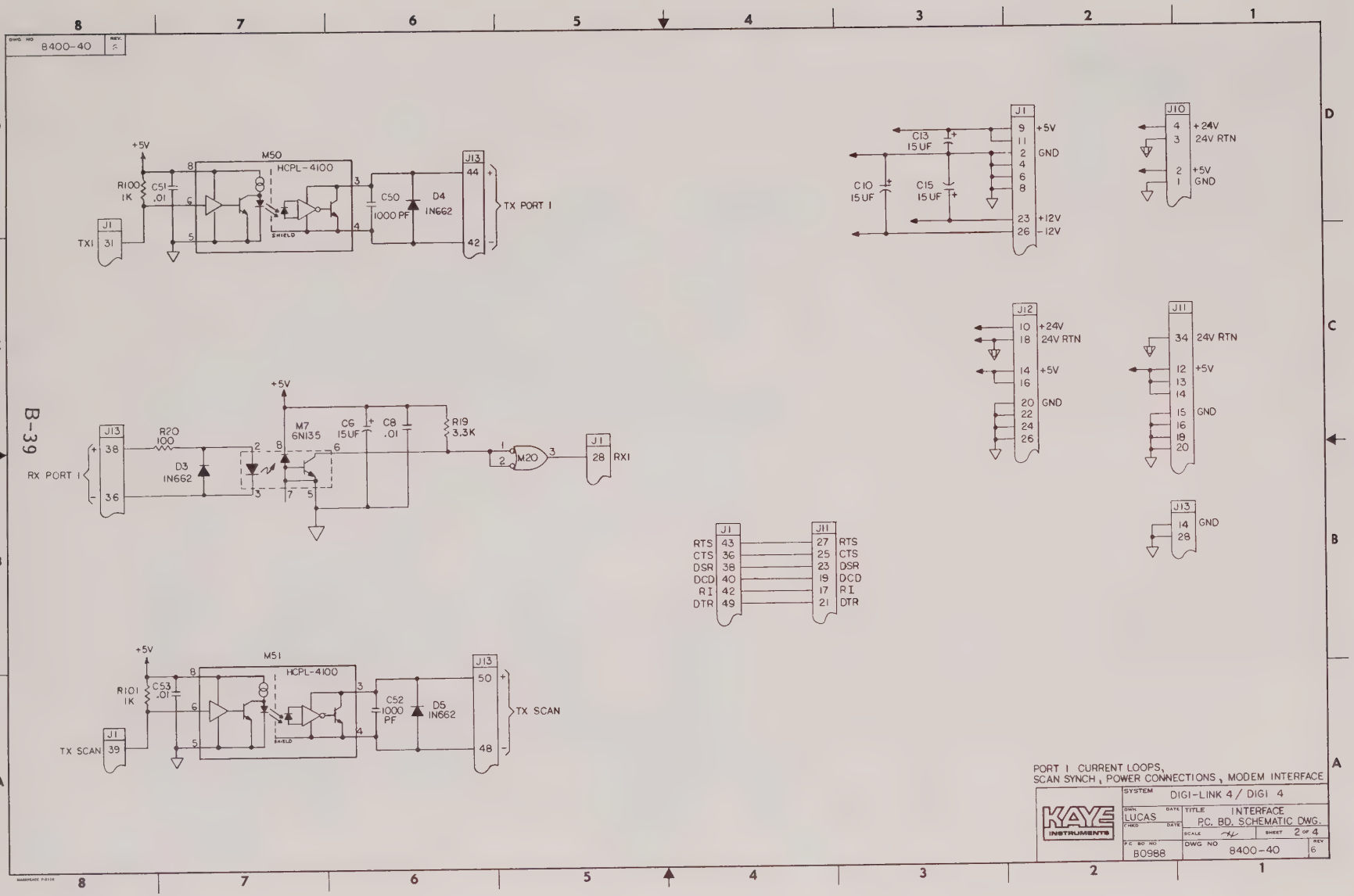

DISPLAY KEYBOARD INTERFACE
KAYE
SYSTEM DIGI 4 PLUS
TITLE 4 PLUS DA
DWG NO. 8400-69
PCB NO. 8919
REV. E
SIZE D
DATE 7/88
APPROVALS
DRAWN
CHECKED
ISSUED
SHEET 3 OF 6
Q2 /.MJE210
Q1 /.MJE210
Q10 /.MJE210
Q9 /.MJE210
Q15 /.MJE210
Q7 /.MJE210
Q11 /.MJE210
Q12 /.MJE210
Q4 /.MJE210
Q13 /.MJE210
Q3 /.MJE210
Q8 /.MJE210
Q5 /.MJE210
Q16 /.MJE210
Q14 /.MJE210
Q6 /.MJE210
J4 31: C0
J4 32: C1
J4 33: C2
J4 34: C3
J4 10: C4
J4 9: C5
J4 26: C6
J4 25: C7
J4 22: C8
J4 19: C9
J4 27: C10
J4 3: C11
J4 18: C12
J4 4: C13
J4 15: C14
J4 12: C15
RP6 1K /.N1264
RP7 1K /.N1264
RP5 100 /.N1206
RP4 100 /.N1206
RP8 100 /.N1206
RP9 100 /.N1206
M56 /.74LS145
M62 /.74LS145
M54-E /.74LS04
J4 30: G
J4 29: E
J4 28: F
J4 24: D.P.
RP2 33 /.N1225
RP3 33 /.N1225
J4 21: B
J4 6: A
J4 1: C
J4 2: D
M46-A /.754528
M47-A /.754528
M46-B /.754528
M47-B /.754528
M53-B /.754528
M53-A /.754528
M52-A /.754528
M52-B /.754528
J4 35: G0
J4 36: G1
J4 37: G2
J4 38: G3
J4 39: G4
J4 41: G5
M55 /.74LS42
M44 /.74LS174
M48 /.74LS174
M54-B /.74LS04
M39 /.8279
R24 100 /.N0064
CBB 0.01 /.C0190
M54-C /.74LS04
J4 49: R7
J4 50: R6
J4 47: R5
J4 48: R4
J4 45: R3
J4 46: R2
J4 44: R1
J4 43: R0
J4 13: SHIFT
J4 11: CNTL
1.2MHZ
RESET
DISPLAYCS

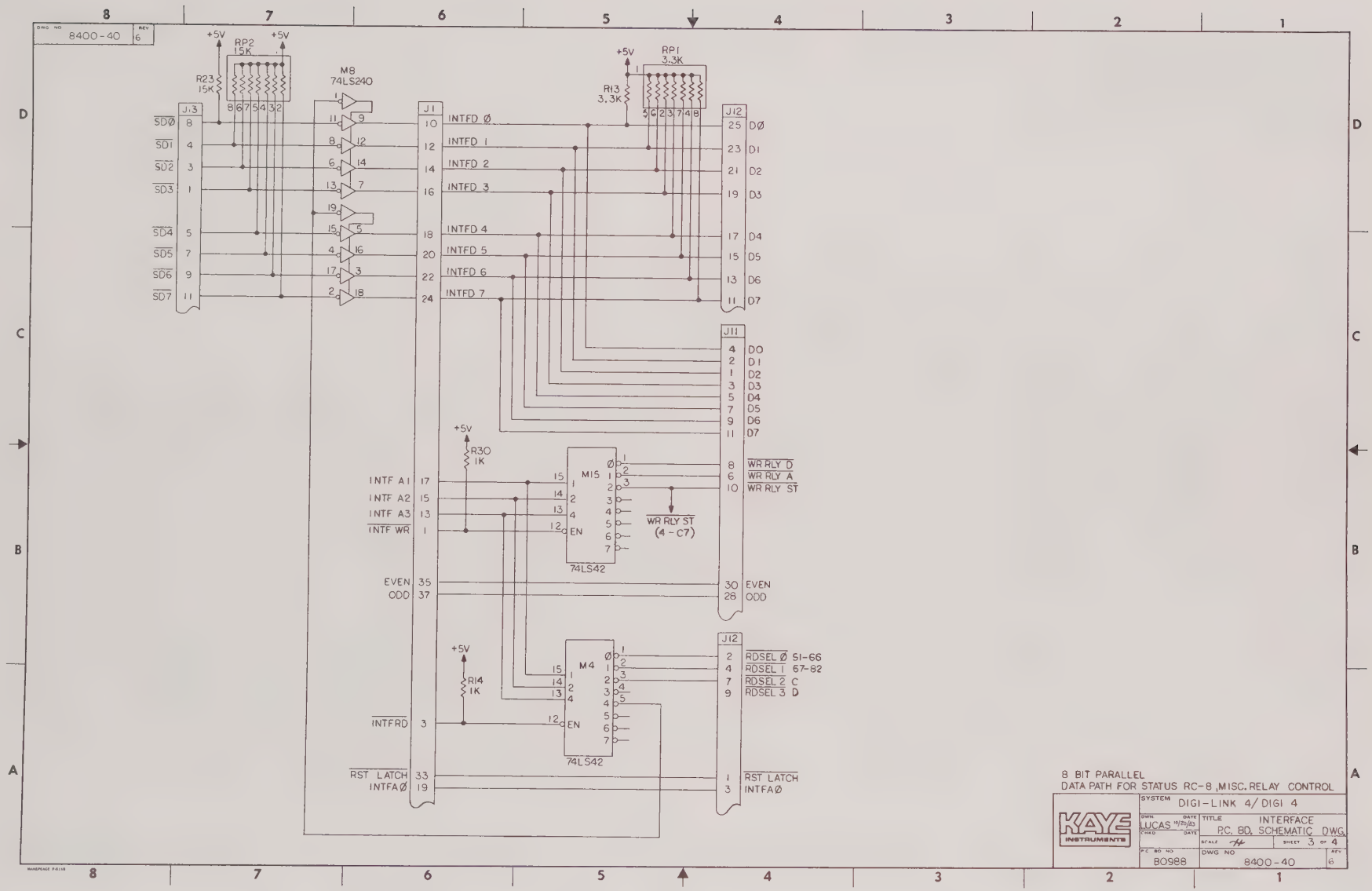

DVM CONTROL
KAYE
SYSTEM DIGI 4 PLUS
TITLE 4 PLUS DA
DATE 7/88
APPROVALS
DRAWN
CHECKED
ISSUED
SIZE D
DWG NO. 8400-69
PCB NO. 8919
REV. 2
4 OF 6
M8 /.74LS367A
M7 /.74LS373
M6 /.74LS373
M9 /.DAPAL
M10 /.74F374
M17 /.74AS161
M23-D /.74LS32
M23-B /.74LS32
M15-B /.74LS02
M15-A /.74LS02
M24-F /.74AS04
R8 10.0K /.4652
S1 /.DIPS4
J2 24: OPENCKT
J2 25: POLARITY
J2 26: 60HZ
J2 30: DPSYNCOMMAND
J2 28: INT
SELDPINT
SCANNER
RINGCOM
CPUCLKIN
PSCLK
RESET
ADCYC
60HZ
50HZ/60HZ
39KHZ
SINT
BETA
R
S
ALPHA

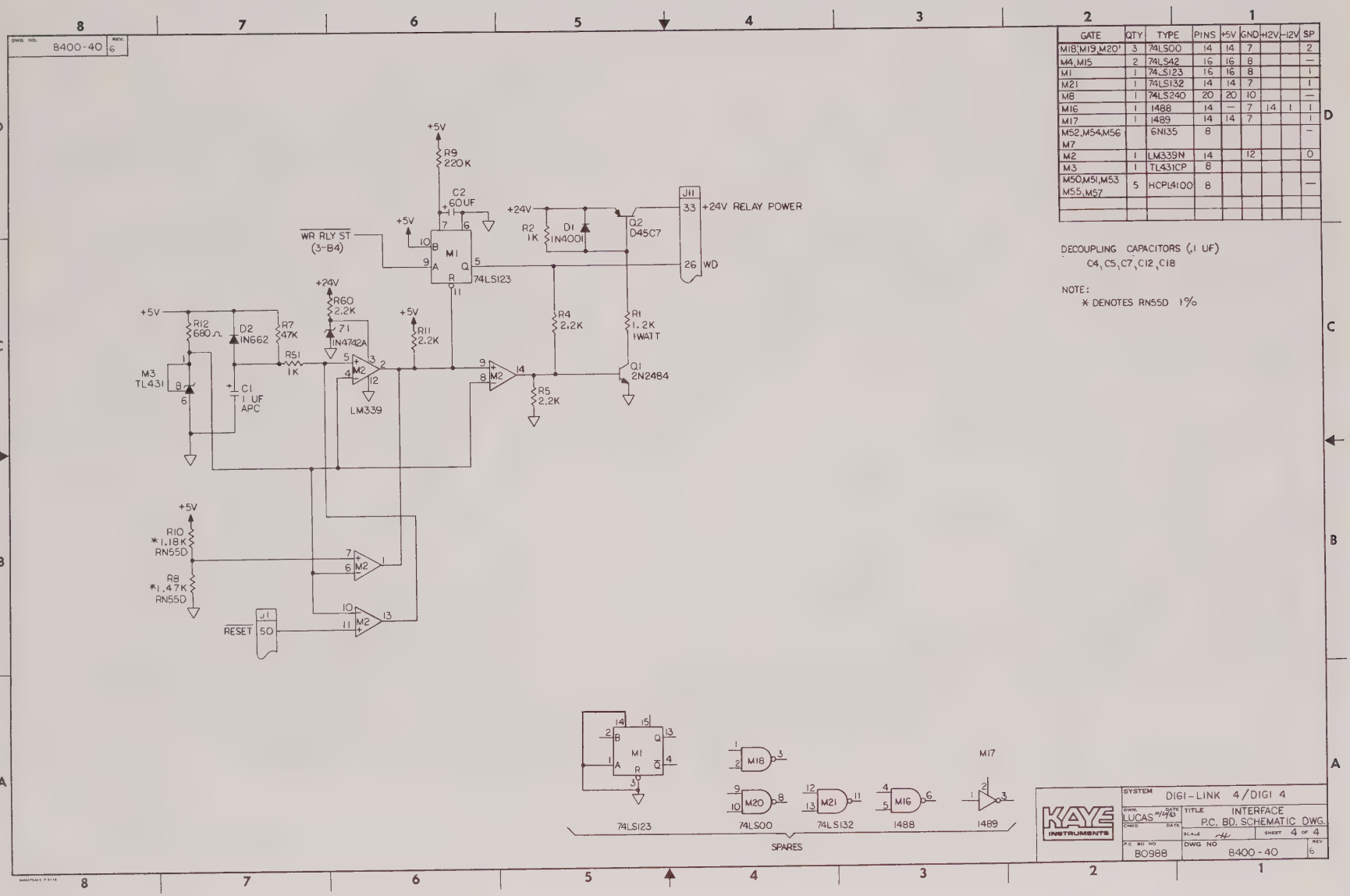

I/O DRIVE: BATTERY CHARGER
POWER DETECTION, POWER CONN, MODEM INTERFACE
KAYE SYSTEM
DIGI 4 PLUS
4 PLUS DA
APPROVALS
DRAWN
CHECKED
ISSUED
DATE
7/88
SIZE
D
DWG NO: 8400-69
PCB NO: 8919
REV: 2
SHT 5 OF 6
MODEM INTERFACE
MASTER RELAYS
POWERFAIL
PWRFAIL
DPWRON
+12V
-12V
+5
+SCM
PRINTERTX
PORT2TX
TERMTX
PORT1TX
PORT2RX
TERMRX
PRINTERRX
INTFD7
INTFD6
INTFD5
INTFD4
INTFD3
INTFD2
INTFD1
INTFD0
INTFA0
INTFA1
INTFA2
INTFA3
INTFWR
INTFRD
IOD7
IOD6
IOD5
IOD4
IOD3
IOD2
IOD1
IOD0
IOA0
IOA1
IOA2
IOA3
IOWR
IORD
RTSCCS
ATSCCS
WR
RD
J1 49: DTR
J1 47: RLY0
J1 45: RLY1
J1 43: RTS
J1 35: EVEN
J1 37: ODD
J1 39: TXSCAN
J1 41: SELCLASS
J1 36: CTS
J1 38: DSR
J1 40: DCD
J1 42: RI
J1 23: +12V
J1 26: -12V
J3T 3/+L12406 6: EDGE61
J3B 3/+L12407 6: EDGE68
TP3 /.E0170
TP4 /.E0170
TP1 /.E0170
TP2 /.E0170
TP7 /.E0170
J3B 6:PWRON
J3T 6:PWRFAIL
R17 499K /.N0414
R16 10.0K /.N0267
R7 1.00K /.N0171
R22 1.00K /.N0171
R23 47.5K /.N0332
R21 332 /.N0122
D2 /.1N914
D3 /.CD5H-4 (NOT USED)
Q7 /.MJE210
B1 /.BAT3.6
M5-C /.4066B
M1 /.74LS245
M19 /.74LS245
M3 /.74LS245
M4 /.74LS373
M12-C /.74LS32
M13-D /.74LS08
M14-A /.74LS02
M14-B /.74LS02
M14-C /.74LS02
M2-A /.1488
M2-B /.1488
M2-C /.1488
M2-D /.1488
M5-A /.1488
M5-C /.1488
M21-A /.74AS04
M21-C /.74AS04
M28 /.74LS367A
SEL468
C32 1000 UF 35V
C1 15 20V
D1 1N4740 10V


RAM & ROM DECODING
KAYE
SYSTEM DIGI 4 PLUS
TITLE 4 PLUS DA
DWG NO. 8400-69
PCB NO. 8919
REV 2
SHEET 6 OF 6
SIZE D
APPROVALS
DRAWN
CHECKED
ISSUED
DATE 7/88
REV ECO DATE DESCRIPTION
SPARES
SELROM
SELRAM
SELBANK0-3
SELBANK4-5
DPWRON
0000 - 5FFF
6000 - 7FFF
8000 - FBFF
FC00-FDFF
FE00-FFFF
+5
+12V
-12V
+5CM

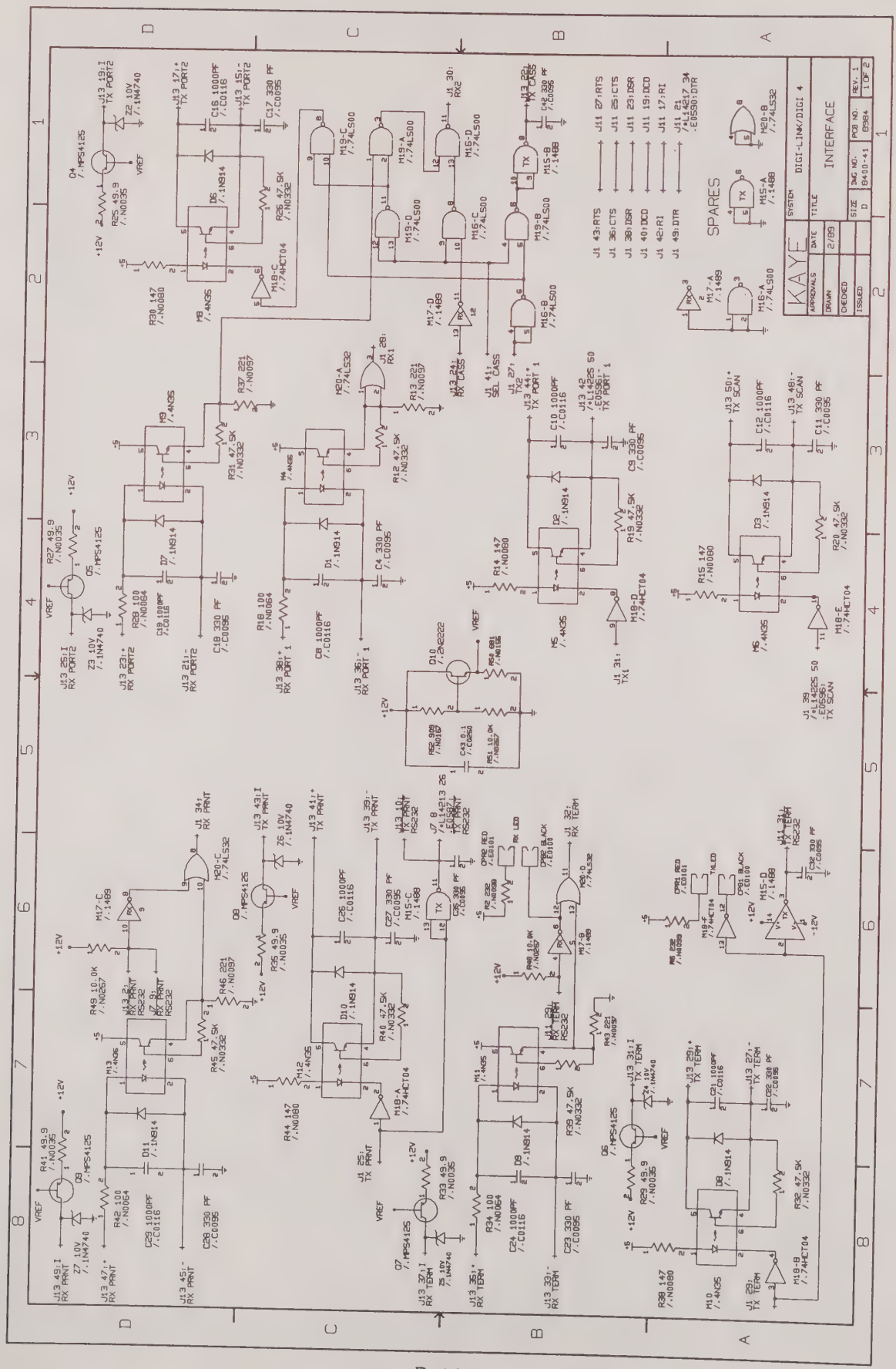
SYSTEM DIGI-LINK 4 / DIGI 4
TITLE INTERFACE PC. BD. SCHEMATIC DWG.
DWG NO 8400 - 40
REVISIONS
NO 5 ECO 1858 DESCRIPTION RELEASED
6 1891 M7 WAS 6N137
KAY INSTRUMENTS
TX-PORT 2
RX-PORT2
TX-TERM
RX-TERM
TX PRNT
RX PRNT
RXCASS
SEL CASS
TXCASS
RX2
TX TERM
RX TERM
TX PRNT
RX PRNT
HCPL-4100
2N2905
1N4740
1N662
6N135

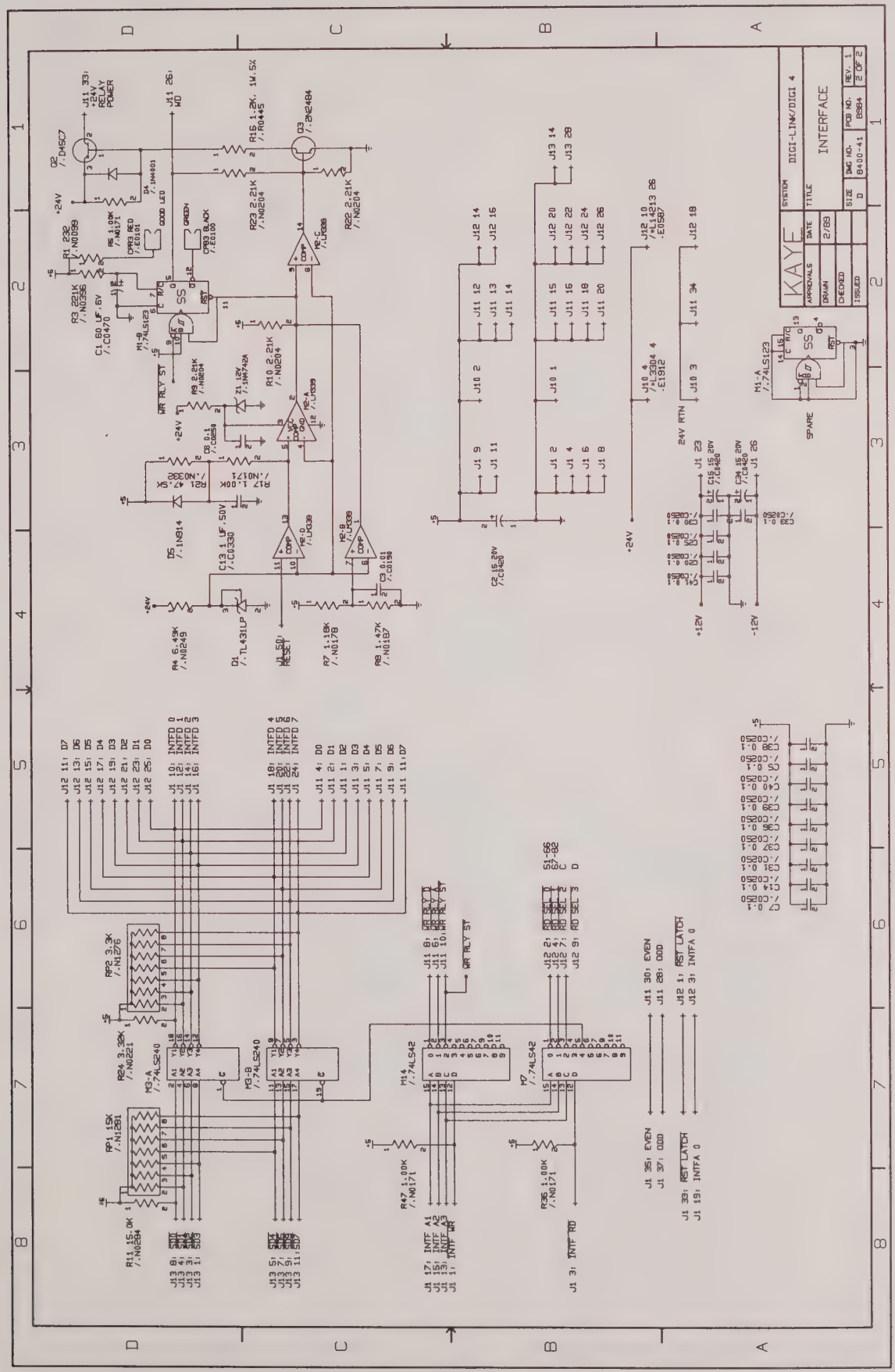

DWG. NO 8400-40 REV. 5
M50
HCPL-4100
R100 1K
C51 .01
C50 1000 PF
D4 IN662
J13 44 42
TX PORT 1
J1 TX1 31
+5V
M7 6N135
C6 15UF
C8 .01
R19 3.3K
R20 100
D3 IN662
J13 38 36
RX PORT 1
M20
J1 28 RX1
M51
HCPL-4100
R101 1K
C53 .01
C52 1000 PF
D5 IN662
J13 50 48
TX SCAN
J1 TX SCAN 39
C13 15UF
C10 15UF
C15 15UF
J1 9 +5V
11 2 4 6 8 GND
23 +12V
26 -12V
J10 4 +24V
3 24V RTN
2 +5V
1 GND
J12 10 +24V
18 24V RTN
14 16 +5V
20 22 24 26 GND
J11 34 24V RTN
12 13 14 +5V
15 16 18 20 GND
J13 14 28 GND
J1 RTS 43
CTS 36
DSR 38
DCD 40
RI 42
DTR 49
J11 27 RTS
25 CTS
23 DSR
19 DCD
17 RI
21 DTR
PORT 1 CURRENT LOOPS,
SCAN SYNCH, POWER CONNECTIONS, MODEM INTERFACE
KAYE INSTRUMENTS
SYSTEM DIGI-LINK 4 / DIGI 4
DWN LUCAS
TITLE INTERFACE
P.C. BD. SCHEMATIC DWG.
SCALE
SHEET 2 OF 4
P.C. BD. NO B0988
DWG NO 8400-40
REV 6

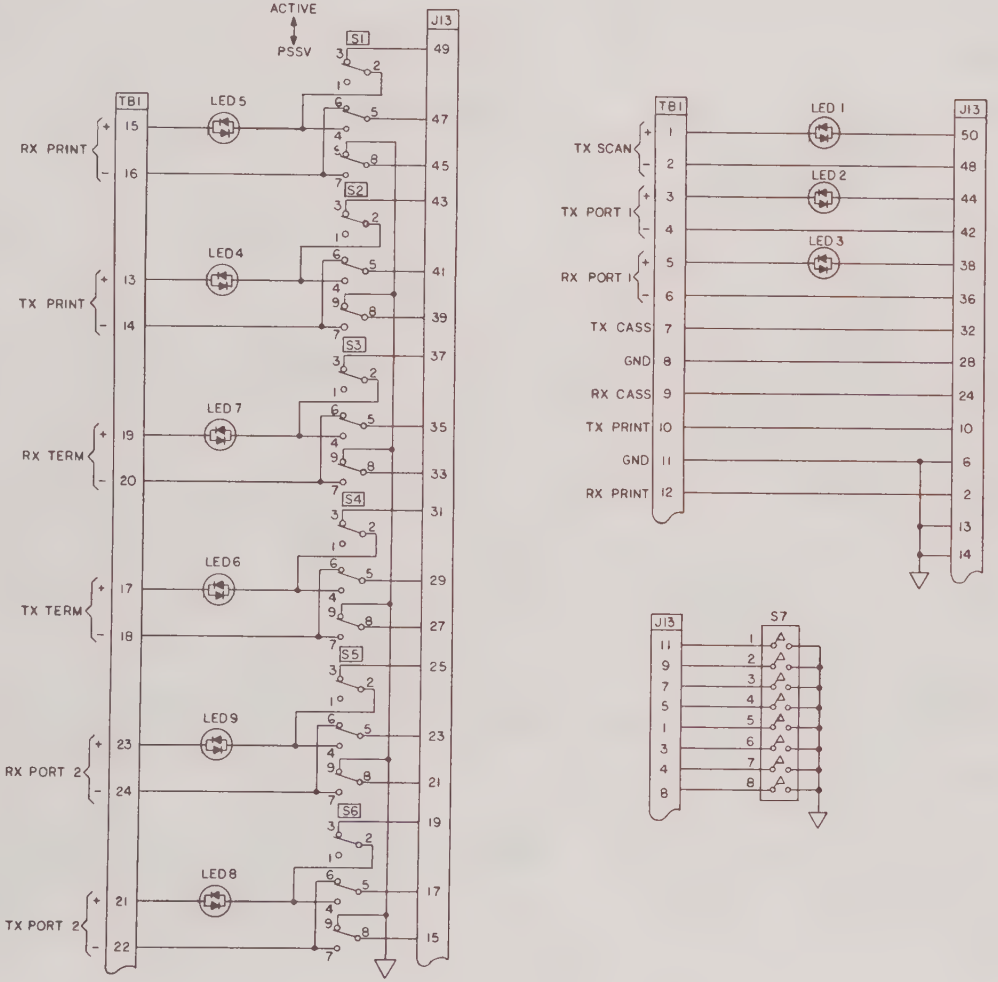

DWG NO 8400-40 REV 6
+5V
RP2 15K
R23 15K
M8 74LS240
RP1 3.3K
R13 3.3K
J13
J1
J12
SDØ
SD1
SD2
SD3
SD4
SD5
SD6
SD7
INTFD Ø
INTFD 1
INTFD 2
INTFD 3
INTFD 4
INTFD 5
INTFD 6
INTFD 7
DØ
D1
D2
D3
D4
D5
D6
D7
J11
D0
R30 1K
M15
74LS42
INTF A1
INTF A2
INTF A3
INTF WR
WR RLY D
WR RLY A
WR RLY ST
WR RLY ST (4-C7)
EVEN
ODD
R14 1K
M4
INTFRD
RDSEL Ø SI-66
RDSEL 1 67-82
RDSEL 2 C
RDSEL 3 D
RST LATCH
INTFAØ
8 BIT PARALLEL
DATA PATH FOR STATUS RC-8 ,MISC. RELAY CONTROL
KAYE INSTRUMENTS
SYSTEM DIGI-LINK 4/DIGI 4
DWN LUCAS 10/29/83
TITLE INTERFACE P.C. BD. SCHEMATIC DWG.
SCALE 3/4
SHEET 3 OF 4
P.C. BD. NO 80988
DWG NO 8400-40
REV 6
B-40



GATE	QTY	TYPE	PINS	+5V	GND	+12V	-12V	SP
M18,M19,M20'	3	74LS00	14	14	7			2
M4,M15	2	74LS42	16	16	8			—
M1	1	74LS123	16	16	8			1
M21	1	74LS132	14	14	7			1
M8	1	74LS240	20	20	10			—
M16	1	1488	14	—	7	14	1	1
M17	1	1489	14	14	7			1
M52,M54,M56 M7		6N135	8					—
M2	1	LM339N	14		12			0
M3	1	TL431CP	8					
M50,M51,M53 M55,M57	5	HCPL4100	8					—

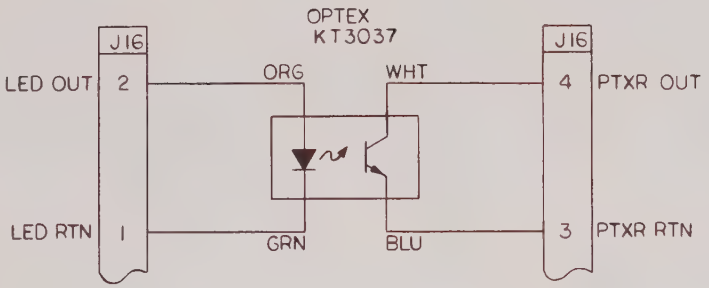

KAYE
DIGI-LINK/DIGI 4
INTERFACE
SPARES


KAYE
SYSTEM
DIGI-LINK/DIGI 4
TITLE
INTERFACE
APPROVALS
DATE
2/89
DRAWN
CHECKED
ISSUED
SIZE
D
DWG NO.
8400-41
PCB NO.
8384
REV. 1
2 OF 2
+24V
+12V
-12V
+5
24V RTN
SPARE
WR RLY ST
RST LATCH
INTFA 0
INTF RD
EVEN
ODD

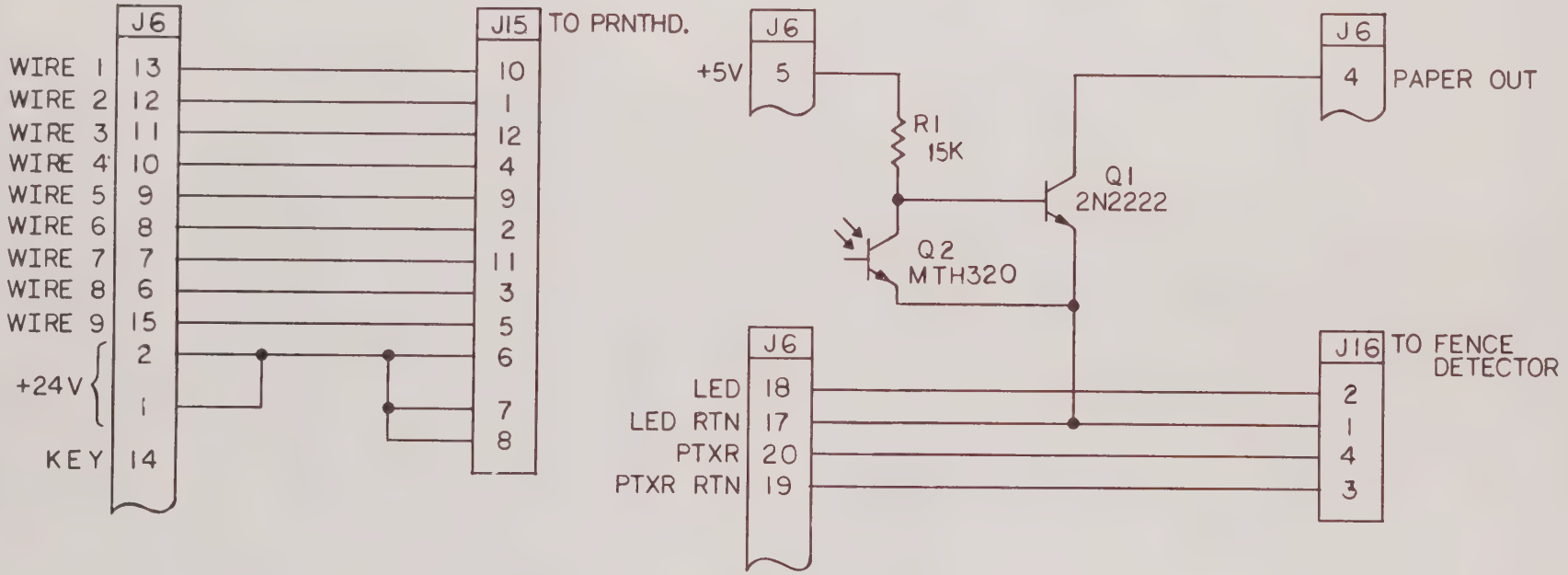


SYSTEM	DIGI 4 / DIGI-LINK 4
DWN LUCAS 6-2-83	TITLE SERIAL I/O PC. BD. SCHEMATIC DWG.
CHKD S.L. 7/7/84	SCALE — SHEET 1 OF 1
P.C. BD. NO 80936	DWG NO 8400-36 REV 1

KAYE INSTRUMENTS



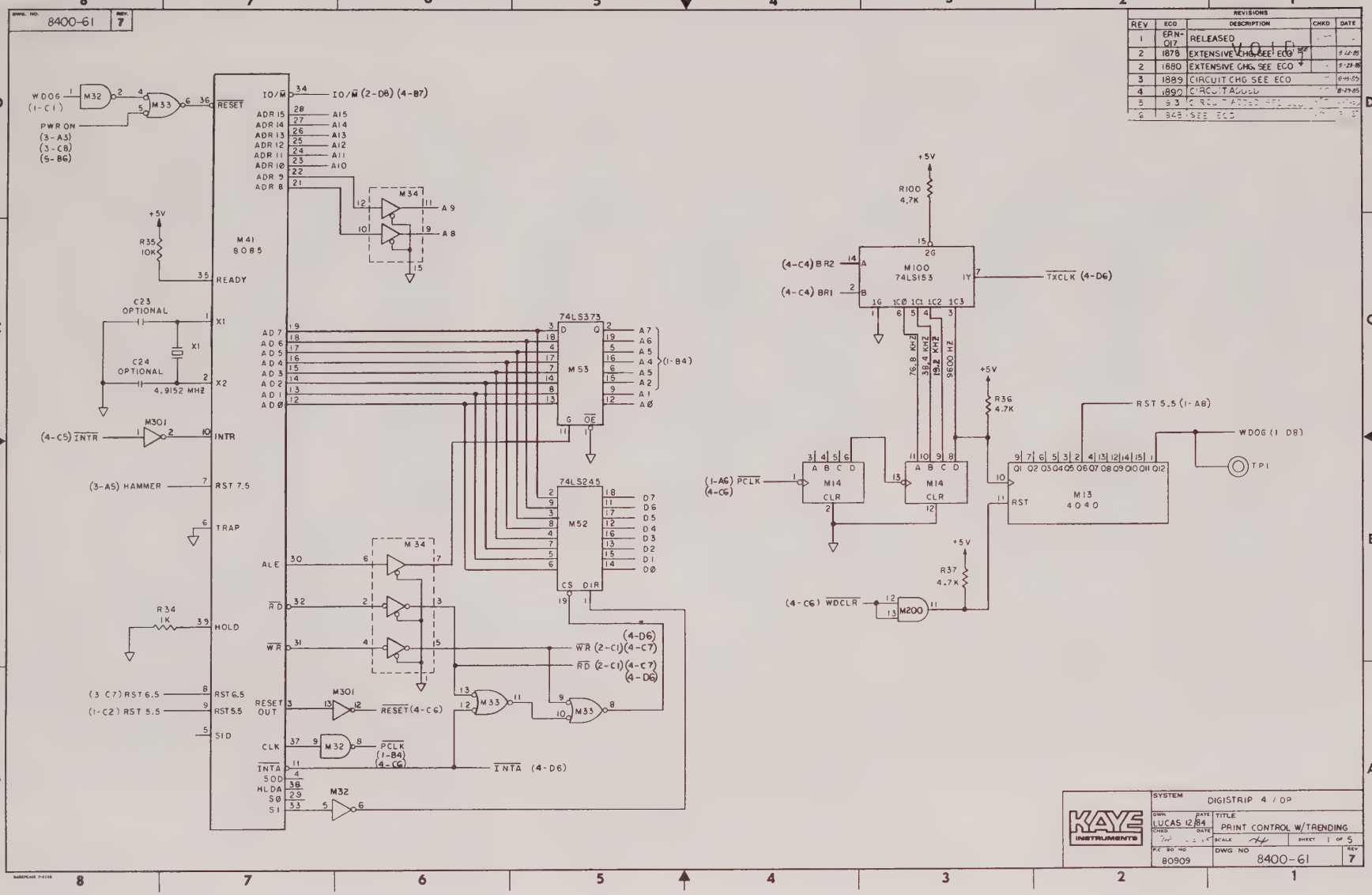
KAYE INSTRUMENTS	SYSTEM	DIGISTRIP 4	
	DWN. LUCAS 11/28/83	TITLE	FENCE DETECTOR P.C. BD. SCHEMATIC DWG.
	CHKD	SCALE	SHEET 1 OF 1
	P.C. BD NO 80906	DWG. NO.	8400 - 38 REV 1



B-46

KAYE INSTRUMENTS

SYSTEM DIGISTRIP 4			
DWN. LUCAS DATE 1/17/84	TITLE P.C.BD. SCHEMATIC PRINTHEAD		
CHKD. S. Tur DATE 2/14/84	SCALE	SHEET 1 OF 1	
P.C.BD. NO. B0986	DWG. NO. 8400 - 47	REV. 2	


8400-61
REV 7
REVISIONS
REV | ECO | DESCRIPTION | CHKD | DATE
1 | ERN-017 | RELEASED
2 | 1878 | EXTENSIVE CHG SEE ECO
2 | 1880 | EXTENSIVE CHG SEE ECO
3 | 1889 | CIRCUIT CHG SEE ECO
4 | 1892 | CIRCUIT ADDED
5 | 93 | 2 REQ'D ADDED
6 | 948 | SEE ECO
M41 8085
M100 74LS153
M13 4040
M14
M52
M53
74LS373
74LS245
M200
M301
M32
M33
M34
R100 4.7K
R35 10K
R34 1K
R36 4.7K
R37 4.7K
C23 OPTIONAL
C24 OPTIONAL
X1
4.9152 MHZ
WDOG (1-C1)
PWR ON (3-A3) (3-C8) (5-B6)
READY
INTR
HAMMER
RST 7.5
TRAP
HOLD
RST6.5
RST5.5
SID
RESET
ALE
RD
WR
CLK
INTA
SOD
HLDA
SO
SI
IO/M (2-D8) (4-B7)
ADR 15 A15
ADR 14 A14
ADR 13 A13
ADR 12 A12
ADR 11 A11
ADR 10 A10
ADR 9 A9
ADR 8 A8
AD7 AD6 AD5 AD4 AD3 AD2 AD1 AD0
A7 A6 A5 A4 A3 A2 A1 A0 (1-B4)
D7 D6 D5 D4 D3 D2 D1 D0
(4-C4) BR2
(4-C4) BR1
TXCLK (4-D6)
76.8 KHZ
38.4 KHZ
19.2 KHZ
9600 HZ
(1-A6) PCLK (4-C6)
RST 5.5 (1-A8)
WDOG (1 D8)
TP1
(4-C5) INTR
(3-A5) HAMMER
(3 C7) RST 6.5
(1-C2) RST 5.5
RESET (4-C6)
PCLK (1-B4) (4-C6)
INTA (4-D6)
WR (2-C1) (4-C7)
RD (2-C1) (4-C7) (4-D6)
(4-C6) WDCLR
SYSTEM DIGISTRIP 4 / DP
KAYE INSTRUMENTS
DWN LUCAS 12/84
TITLE PRINT CONTROL W/TRENDING
CHKD
SCALE
SHEET 1 OF 5
P.O. NO 80909
DWG NO 8400-61
REV 7

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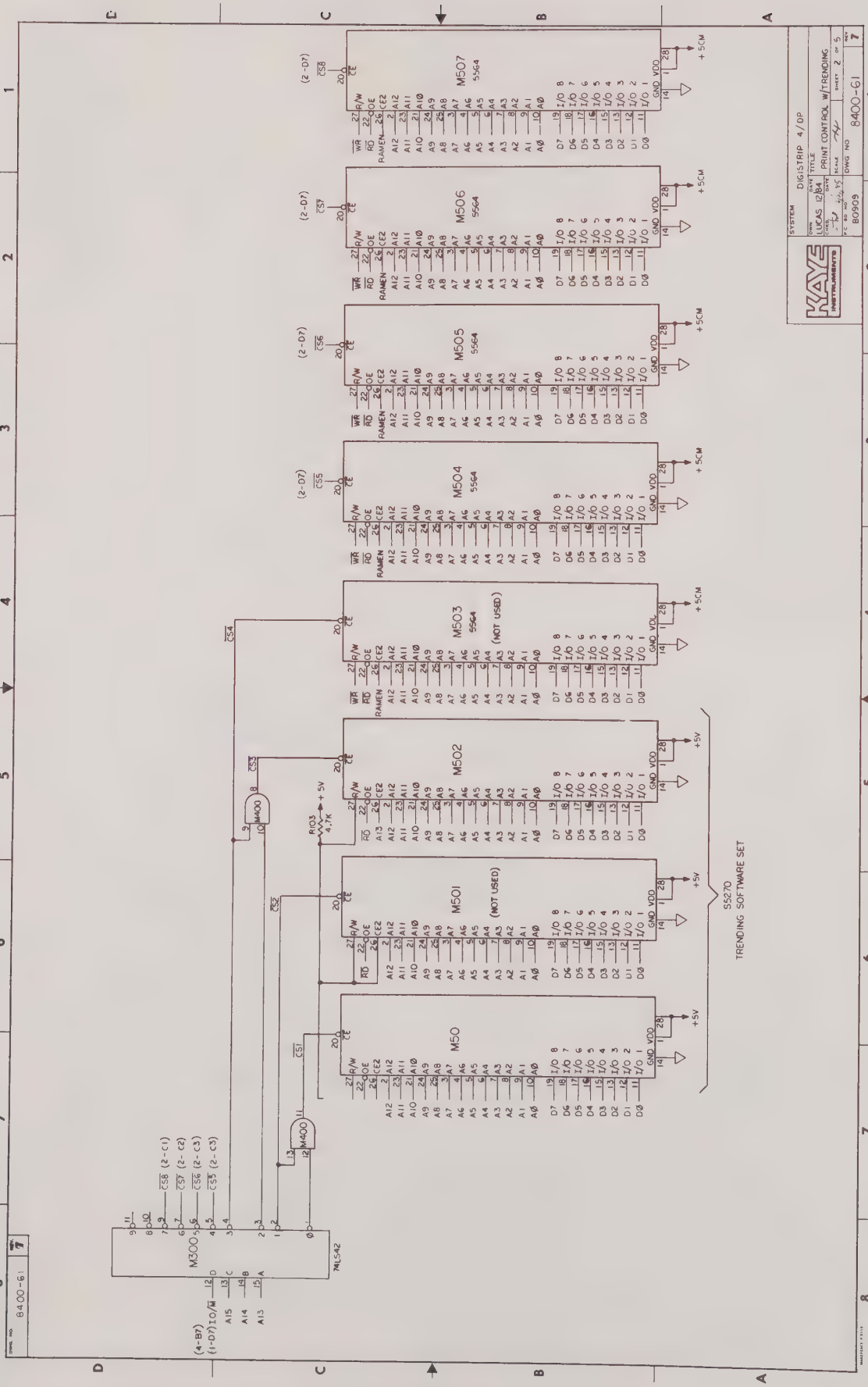
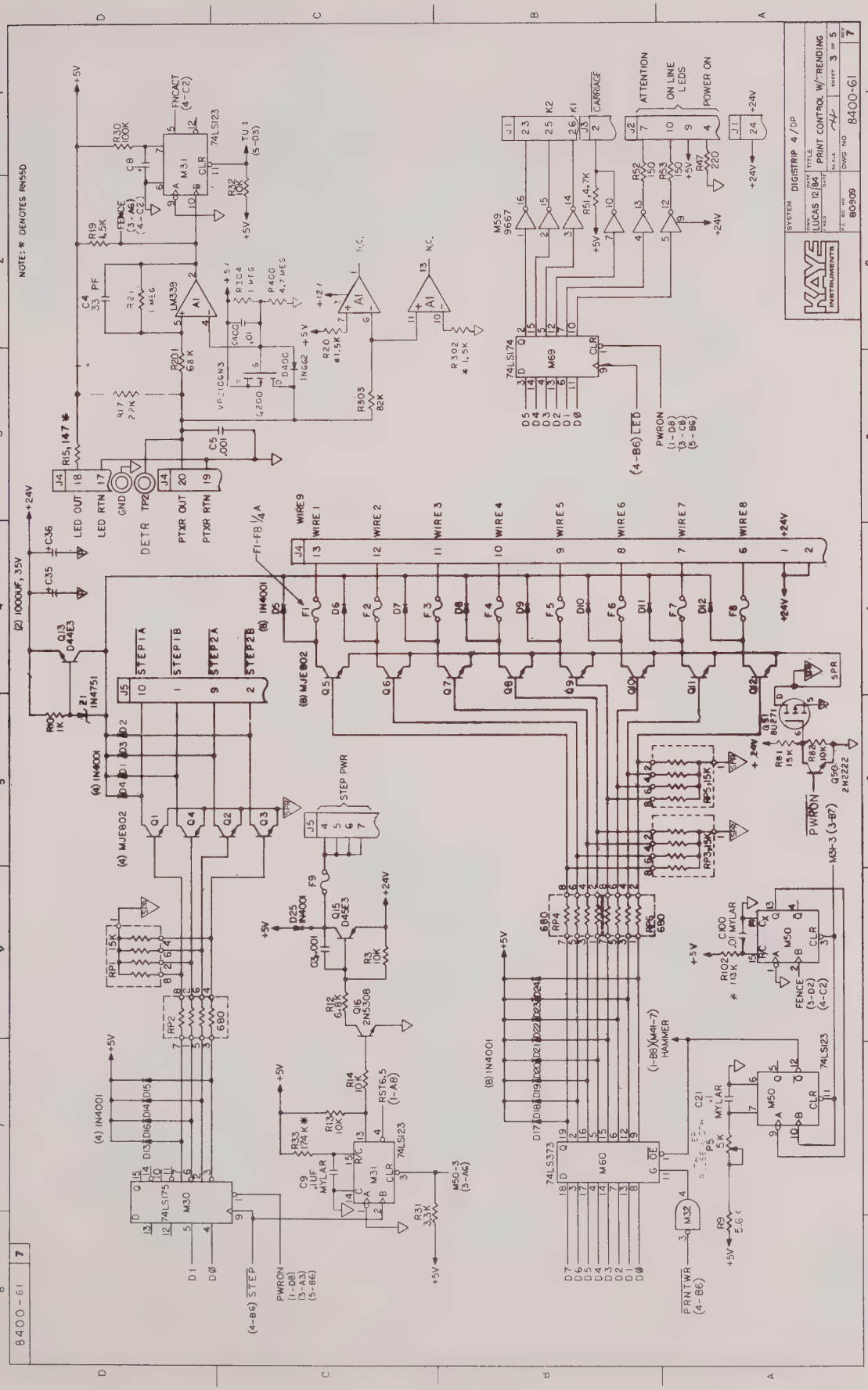
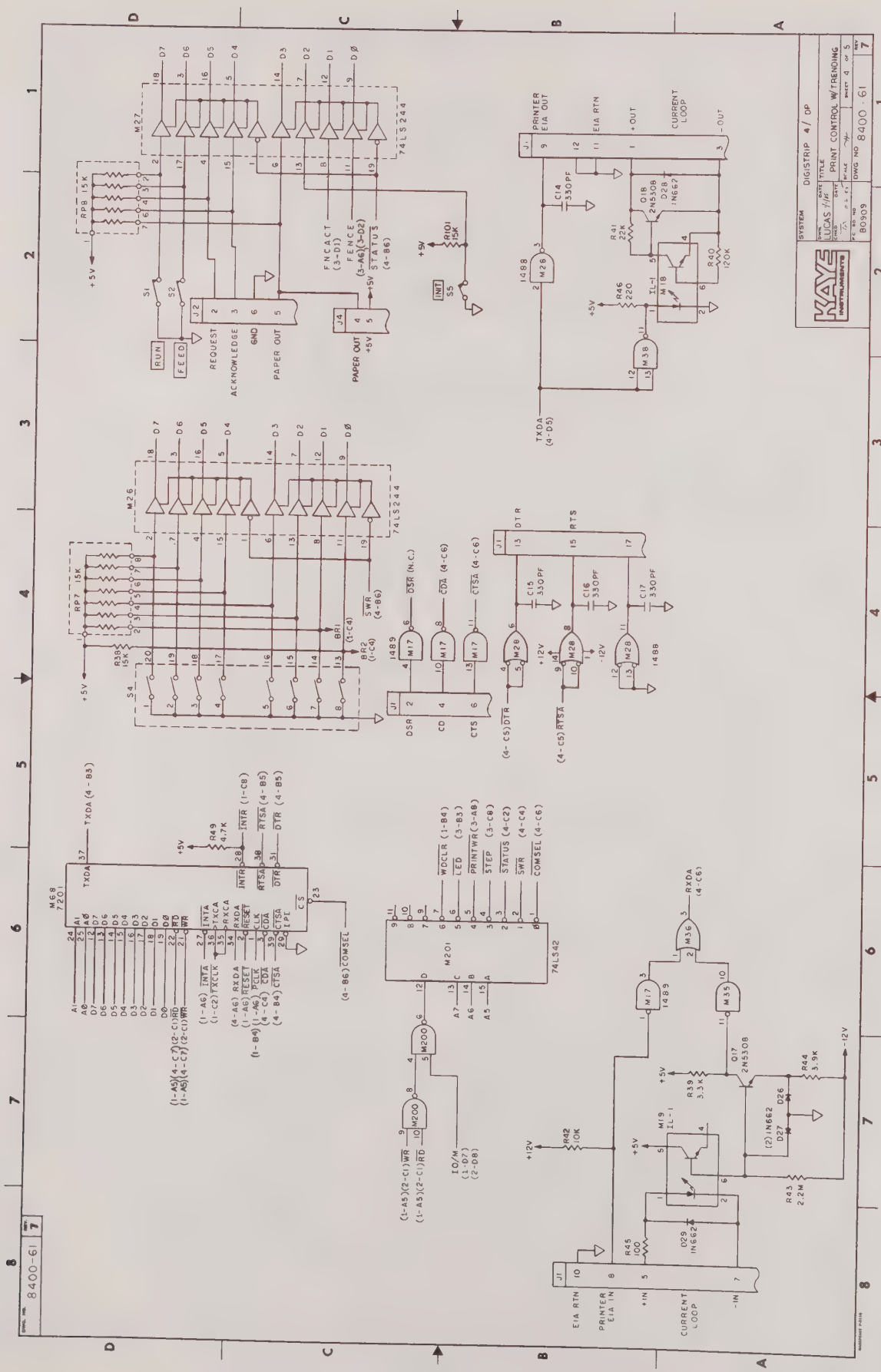
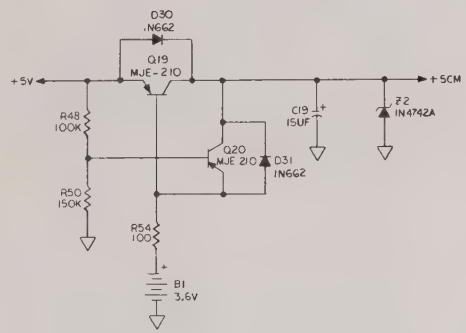
08/21/87

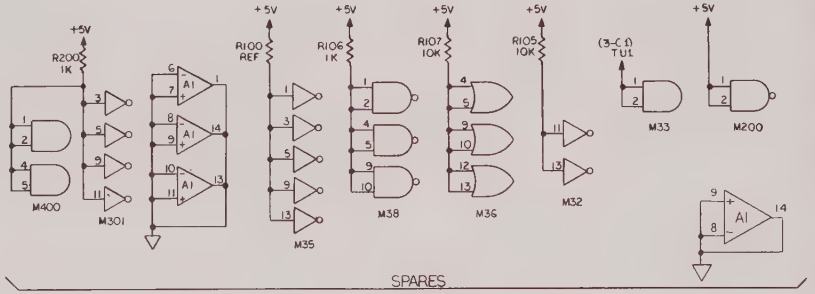

SYSTEM DIGISTRIP 4/DP
TITLE PRINT CONTROL W/TRENDING
DWG NO 8400-61
SHEET 2 OF 5
REV 7
KAY INSTRUMENT
M50
M501
M502
M503
M504
M505
M506
M507
M300
74LS42
M400
5564
(NOT USED)
+5V
+5CM
R103 4.7K
(4-B7) (1-D7) IO/W
A15
A14
A13
CS1
CS2
CS3
CS4
CS5 (2-C3)
CS6 (2-C3)
CS7 (2-C2)
CS8 (2-C1)
(2-D7)
RAMEN
55270
TRENDING SOFTWARE SET


NOTE: * DENOTES RN55D
SYSTEM DIGISTRIP 4/DP
TITLE PRINT CONTROL W/RENDING
DWG NO 8400-61
SHEET 3 OF 5
REV 7
KAY INSTRUMENTS
LUCAS 12/84
8400-61
STEP1A
STEP1B
STEP2A
STEP2B
WIRE 1
WIRE 2
WIRE 3
WIRE 4
WIRE 5
WIRE 6
WIRE 7
WIRE 8
LED OUT
LED RTN
GND
DETR TP2
PTXR OUT
PTXR RTN
CARRIAGE
ATTENTION
ON LINE LEDS
POWER ON
STEP PWR
PWRON
PRNTWR
HAMMER
STEP
FENCE (3-D2) (4-C2)
(4-B6) LED
(1-B6)(M41-7)
(4) IN4001
(8) IN4001
(8) MJE802
(4) MJE802
(2) 1000UF, 35V
74LS123
74LS175
74LS373
LM339
VP2106N3
2N2222
2N5308
IN4751
IN4001
IN4002
IN662
D44E3
80271


8400-61
SYSTEM DIGISTRIP 4/DP
TITLE PRINT CONTROL W/TRENCHING
DWG NO 8400-61
SHEET 4 OF 5
REV 7
KAYE INSTRUMENTS
M68 7201
74LS244
74LS42
PRINTER EIA OUT
EIA RTN
+OUT
-OUT
CURRENT LOOP
PRINTER EIA IN
+IN
-IN
REQUEST
ACKNOWLEDGE
GND
PAPER OUT
FENCE STATUS
RUN
FEED
TXDA (4-D5)
RXDA (4-C6)
DSR (N.C.)
CDA (4-C6)
CTSA (4-C6)
DTR
RTS
INTR (1-C8)
RTSA (4-B5)
DTR (4-B5)
WDCLR (1-B4)
LED (3-B3)
PRINTWR (3-A8)
STEP (3-C8)
STATUS (4-C2)
SWR (4-C4)
COMSEL (4-C6)
IO/M (1-D7) (2-D8)
INT
SS

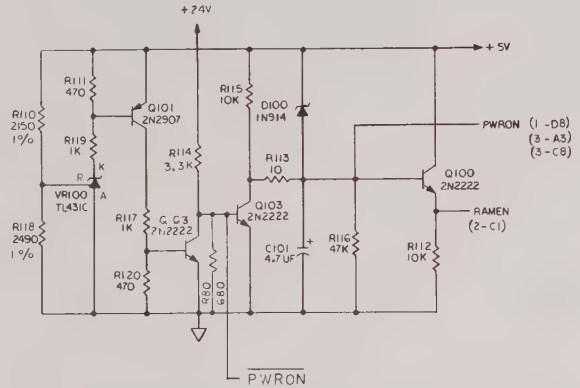
DWG NO 8400-61 REV 7

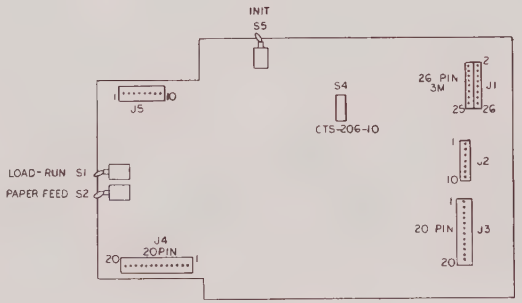


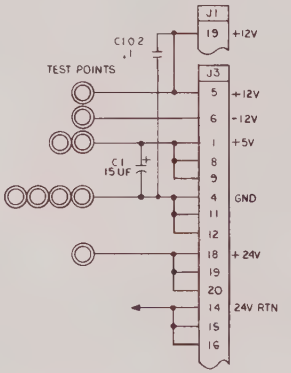


GATE	QTY	TYPE	PINS	+5V	GND	+5CM	+12V	-12V	SPARE
M28	1	1488	14		7		14	1	0
M17	1	1489	14	14	7				0
M13	1	4040	16	16	8				0
M200	1	74LS00	14	14	7				1
M32,M35,M301	2	74LS04	14	14	7				11
M33, M400	2	74LS08	14	14	7				3
M36	1	74LS32	14	14	7				3
M38	1	7438	14	14	7				3
M201,M300	2	74LS42	16	16	8				0
M31, M50	2	74LS123	16	16	8				0
M100	1	74LS153	16	16	8				3
M69	1	74LS174	16	16	8				0
M30	1	74LS175	16	16	8				0
M26, M27	2	74LS244	20	20	10				0
M52	1	74LS245	20	20	10				0
M34	1	74LS367	16	16	8				0
M53, M60	2	74LS373	20	20	10				0
M14	1	74LS393	14	14	7				0
M18, M19	2	IL-1	6						—
M500,501,502	3	2764	28	1,28	14				—
M503-M507	5	5564	28		14	1,28			—
M68	1	7201	40	40	20				—
M41	1	8085	40	40	20				—
M59	1	9667	16		8				—
A1	1	LM339	14		12		3		1

NOTE: ALL DECOUPLING CAPACITORS (.1 UF)
C2,C6,C7,C11,C13,C20,C22&C26-C32,
C41,C50-C58, CA,CC, C201



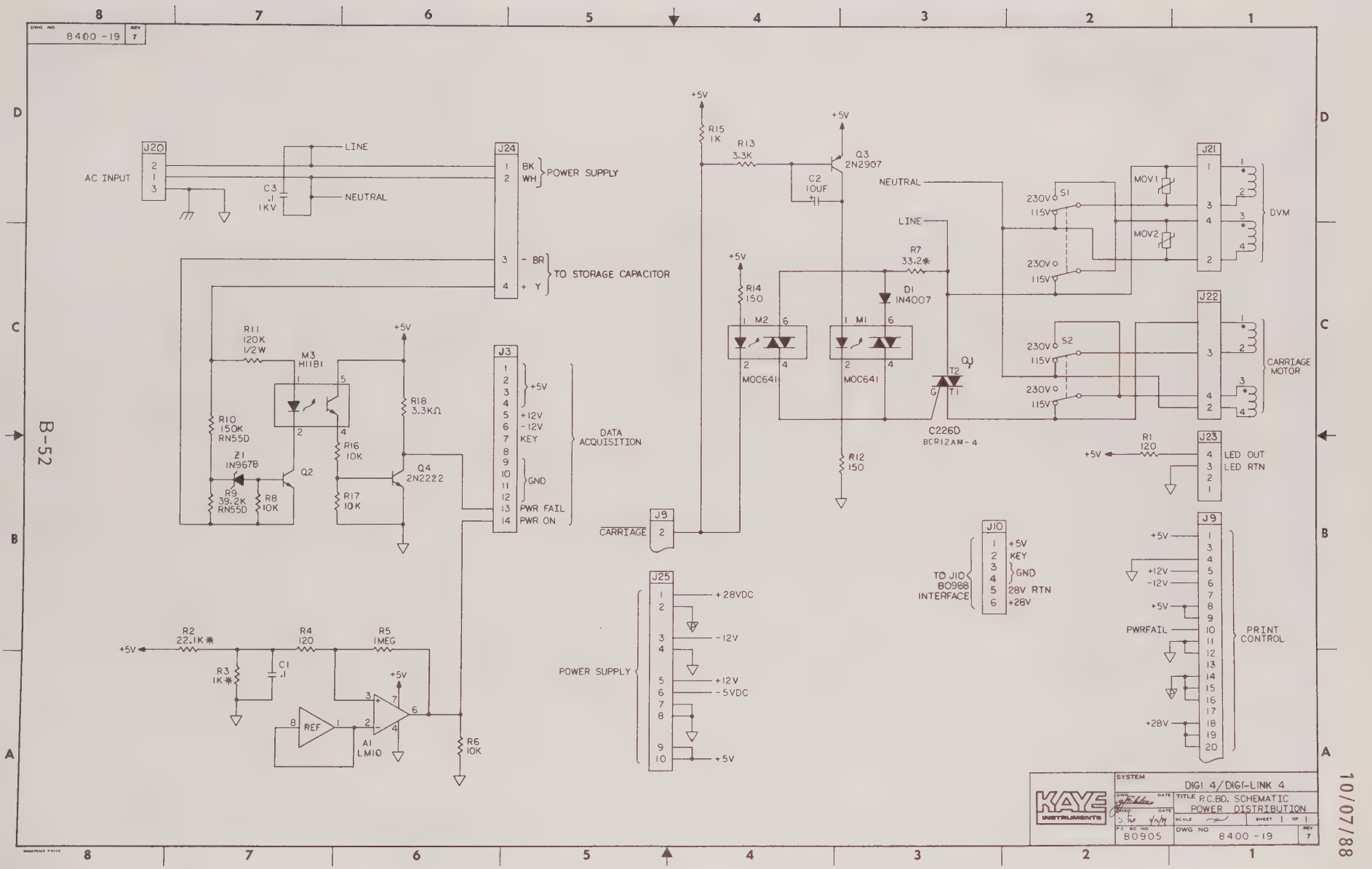


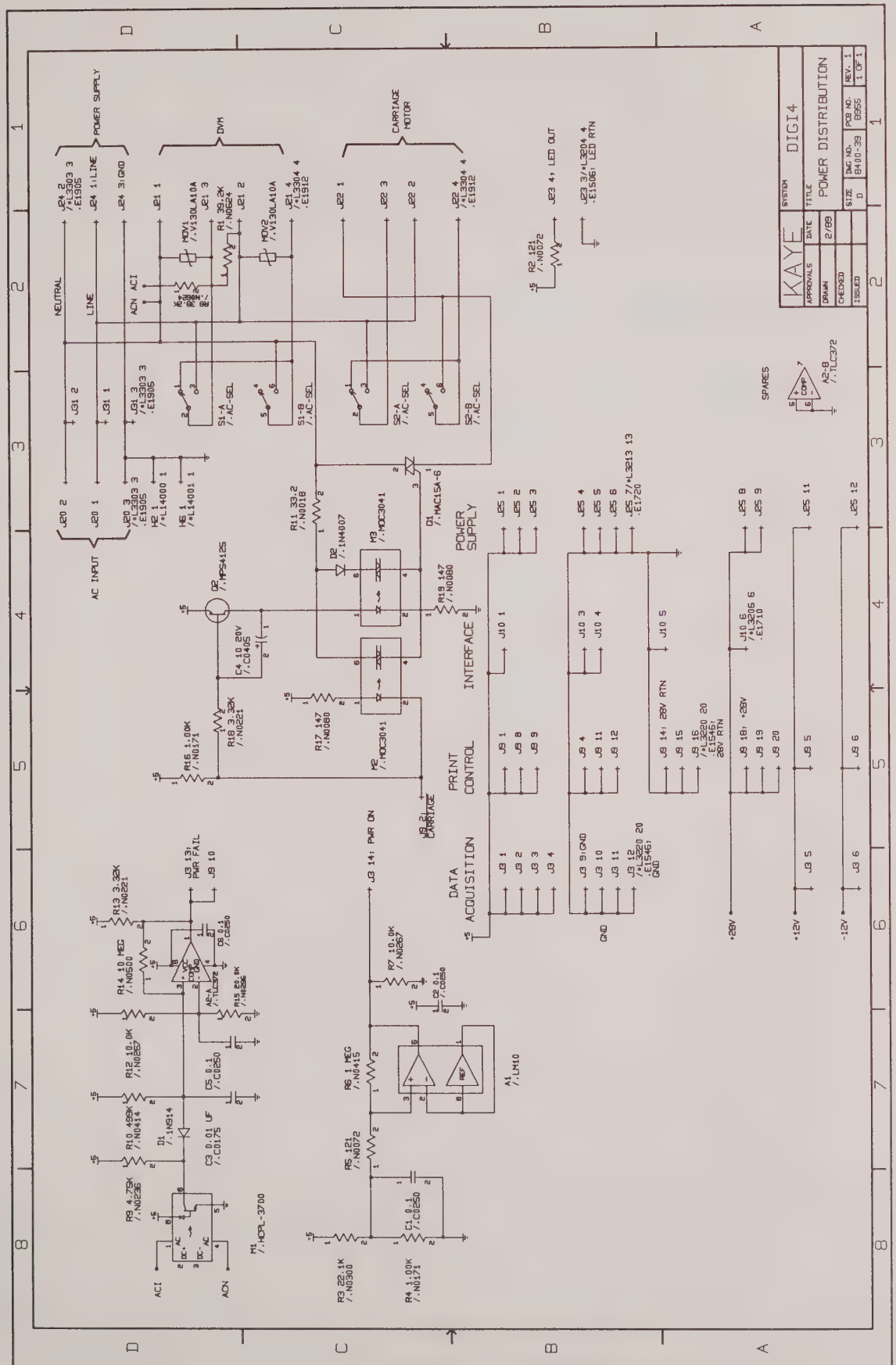


SYSTEM	DIGISTRIP 4/DP
DWN LUCAS 12/84	TITLE PRINT CONTROL W/TRENDING
CHKD DATE	SCALE SHEET 5 OF 5
P.C. BD NO 80909	DWG NO 8400-61 REV 7

KAYE INSTRUMENTS

08/21/87


DWG NO 8400-19 REV 7
J20
AC INPUT
LINE
NEUTRAL
C3 .1 1KV
J24
BK WH POWER SUPPLY
- BR + Y TO STORAGE CAPACITOR
R11 120K 1/2W
M3 H11B1
R10 150K RN55D
Z1 IN967B
R9 39.2K RN55D
R8 10K
Q2
R16 10K
R17 10K
R18 3.3KΩ
Q4 2N2222
+5V
J3
+5V
+12V
-12V
KEY
GND
PWR FAIL
PWR ON
DATA ACQUISITION
R15 1K
R13 3.3K
Q3 2N2907
C2 10UF
R7 33.2*
D1 IN4007
R14 150
M2
M1
MOC6041
MOC6041
Q1
T2
T1
G
C226D BCR12AM-4
R12 150
NEUTRAL
LINE
S1
S2
230V 115V
MOV1
MOV2
J21
DVM
J22
CARRIAGE MOTOR
R1 120
J23
LED OUT
LED RTN
J9
CARRIAGE
J10
TO J10 80988 INTERFACE
+5V
KEY
GND
28V RTN
+28V
J9
PRINT CONTROL
PWRFAIL
R2 22.1K*
R4 120
R5 1MEG
R3 1K*
C1 .1
REF
A1 LM10
R6 10K
J25
POWER SUPPLY
+28VDC
-12V
+12V
-5VDC
+5V
SYSTEM DIGI 4/DIGI-LINK 4
TITLE P.C.BD. SCHEMATIC POWER DISTRIBUTION
KAYE INSTRUMENTS
P.C. BD NO 80905
DWG NO 8400-19
REV 7
SHEET 1 OF 1
B-52
10/07/88


KAYE
DIGI4
POWER DISTRIBUTION
AC INPUT
POWER SUPPLY
DVM
CARRIAGE MOTOR
NEUTRAL
LINE
AC1
ACN
SPARES
DATA ACQUISITION
PRINT CONTROL
INTERFACE
CARRIAGE
POWER SUPPLY
GND
+28V
+12V
-12V

APPENDIX C - DIAGNOSTIC CODES

When you power up a Digi 4 Plus, the system waits 20 seconds for the voltage reference to stabilize. During this time, it beeps 10 times --- once every 2 seconds. Then it performs a self-test to check for integrated circuit problems. If it detects a problem, the front panel flashes a diagnostic error code that identifies the integrated circuit causing the problem.

The restart message also indicates the number of the ROM that failed. If more than one ROM has failed, the highest numbered one appears in the restart message.

The following table lists the error codes and and identifies the integrated circuits. Before you replace the integrated circuit, check the pins; they may be bent or folded under the chip.

Diagnostic Code	Integrated Circuit Number
10	M70 (ROM #0)
11	M71 (ROM #1)
12	M72 (ROM #2)
13	M73 (ROM #3)
14	M74 (ROM #4)
15	M75 (ROM #5)

APPENDIX D - WARRANTY

KAYE INSTRUMENTS, INC.
EQUIPMENT LIMITED WARRANTY

TO WHOM GIVEN:

Kaye Instruments, Inc. ("Kaye") extends this warranty only to the original non-consumer purchaser of its equipment; IT DOES NOT EXTEND TO CONSUMER PURCHASERS FOR PERSONAL, FAMILY OR HOUSEHOLD PURPOSES.

COVERAGE AND LENGTH OF WARRANTY:

1. New Equipment: All new Kaye equipment, except thermocouples and RTD probes, is warranted to be free from manufacturing and material defects for a period of one (1) year after shipment.

2. Thermocouples, RTD Probes, Spare Parts and Repairs: New Kaye thermocouples and RTD probes, and Kaye spare parts for and repairs to Kaye equipment are warranted to be free from manufacturing and material defects for a period of ninety (90) days after shipment.

3. Non-Standard Kaye Products: Equipment provided by Kaye, together with a Kaye system, but which are not standard Kaye products (e.g., magnetic tape recorders, paper tape punches and computers), are warranted by Kaye for a period of thirty (30) days after shipment. If the manufacturer of such equipment provides a longer warranty, Kaye will, if possible, pass this warranty on to its customers.

4. Modifications: Modifications to Kaye equipment performed by authorized Kaye service representatives that increase the performance or capability of that equipment are warranted free from manufacturing and material defects for the following period:

   a. Six (6) months from the date of shipment, or the balance of the original new equipment warranty, whichever is longer, for modifications performed at the Kaye Instruments Factory Service Center in Bedford, Massachusetts.

   b. Ninety (90) days from the date of shipment, or the balance of the original new equipment warranty, whichever is longer, for modifications performed at any other location.

WARRANTY PROCEDURES:

1. What Kaye Will Do: Any equipment or spare parts purchased from Kaye that become defective during the relevant period, or repairs or modifications done by authorized Kaye service representatives that fail during the relevant period, will be repaired or replaced at the customer's site or at the Kaye Instruments plant in Bedford, Massachusetts, at Kaye's option.

2. Procedure for Claims: If a customer believes a defect has occurred under this warranty, the customer should contact the Kaye Instruments Customer Service Department, which will provide instructions as to the procedure to be followed. Return authorization must be obtained from the Customer Service Department prior to returning any equipment for repair. Equipment returned to Kaye for repair must have shipping charges prepaid and must be accompanied by documentation explaining the reason for repair. Any repairs performed by Kaye with respect to defects not covered by this warranty will be subject to time and materials charges at Kaye's standard rates.

DISCLAIMER:

1. Misuse of Products: This warranty is void if the product has been damaged by accident, unreasonable use, negligence, intentional harm, improper assembly or has been subject to unusual physical or electrical stress or has been modified without Kaye's approval.

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